BIOTHERM ENERGY

Proposed Construction of the Sendawo 1 75MW Solar Photovoltaic (PV) Energy Facility near Vryburg, North West Province

Draft Scoping Report

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For:	SiVEST Environmental Division

KEY PROJECT INFORMATION

FARM DESCRIPTION	21 DIGIT SURVEYOR GENERAL CODE
Portion 1 of the Farm Edinburgh No 735	T0HN00000000073500001

SENDAWO PV APPLICATION SITE				
NORTH-WEST CORNER	**NORTH-EAST CORNER**	**CENTRE POINT**	**SOUTH-WEST CORNER**	**SOUTH-EAST CORNER**
S27° 4' 13.872"	S27° 1' 52.680"	S27° 3' 40.690"	S27° 5' 22.740"	S27° 3' 48.672"
E24° 41' 10.716"	E24° 43' 39.900"	E24° 43' 0.553"	E24° 41' 43.116"	E24° 44' 48.228"

DEVELOPMENT AREA			
PHASE	**AREA (HECTARES)**	**CENTRE POINT COORDINATES**	
		SOUTH	**EAST**
SENDAWO SOLAR 1 DEVELOPMENT AREA	367.46	S27° 3' 52.625"	E24° 43' 50.328"

SENDAWO SOLAR 1: DEVELOPMENT AREA		
CORNER POINT COORDINATES (DD MM SS.sss)		
POINT	**SOUTH**	**EAST**
S1_01 (NW)	S27° 3' 11.716"	E24° 43' 7.915"
S1_02	S27° 3' 6.917"	E24° 43' 19.999"
S1_03	S27° 3' 32.997"	E24° 43' 31.458"
S1_04	S27° 3' 37.364"	E24° 44' 10.570"
S1_05 (NE)	S27° 3' 32.580"	E24° 44' 36.627"
S1_06 (SE)	S27° 3' 48.539"	E24° 44' 47.636"
S1_07 (SW)	S27° 4' 38.032"	E24° 43' 7.876"

SENDAWO SOLAR 1: COMPONENTS		
CENTRE POINT COORDINATES (DD MM SS.sss)		
COMPONENT	**ALTERNATIVE 1**	**ALTERNATIVE 2**
SUBSTATION (132kv)	S27° 3' 43.559"	S27° 3' 13.328"
	E24° 44' 40.714"	E24° 43' 11.738"

O&M BUILDINGS	S27° 3' 55.235"	S27° 3' 32.099"
	E24° 44' 30.699"	E24° 43' 56.807"
LAYDOWN AREA	S27° 3' 36.156"	S27° 4' 5.437"
	E24° 44' 29.554"	E24° 44' 11.117"

Refer to Appendix 8A for the full list of coordinates.

TITLE DEEDS: These will be included within the Final Scoping Report (FSR).

PHOTOGRAPHS OF SITE:

General Characteristics of the study area

TYPE OF TECHNOLOGY: Photovoltaic (PV)

STRUCTURE HEIGHT: Estimated to be approximately 4m although the final design details are yet to be confirmed. These details will become available during the detailed design phase of the project.

SURFACE AREA TO BE COVERED: The total area of the application site is 1709 hectares, with the proposed Sendawo 1 development area taking up 367 ha. However, the 75MW energy facility layout will require approximately 350 ha. The footprint of the Operations and Maintenance (O&M) buildings will be approximately 225m^2 and the onsite switching substation will occupy a footprint area of 2.25 ha. The final design details are yet to be confirmed. These details will become available during the detailed design phase of the project.

PV DESIGN: The plant will comprise of either fixed tilt or single axis tracking structures. Either thin film or crystalline silicon modules will be used. The modules will be mounted in rows on the support structures. An Onsite switching substation will contain transformer (s) for voltage step up from medium voltage to high voltage. DC power from the panels will be converted into AC power in the inverters and the voltage will be

stepped up to medium voltage in the inverter transformers. The medium voltage cables will be run underground within the facility, to a common point before being fed to the onsite substation

STRUCTURE ORIENTATION: This will be confirmed during the detailed design phase of the project. For single axis tracking the structures will be mounted on a north-south horizontal axis and will track the sun from east to west. For fixed tilt structures the modules will be north facing tilted at an angle of between 15-30 degrees.

FOUNDATIONS: The foundations will be either concrete or rammed pile. The final foundation design will be determined at the detailed design phase of the project.

LAY-DOWN AREA DIMENSIONS: Approximately 5 hectares is required for the temporary laydown area. Permanent laydown for the containers will be required for the storage of spares, which is to be located close to the O&M building. Approximately 6, 3x12m containers will be required

GENERATION CAPACITY: The project will have a total generation capacity of 75MW.

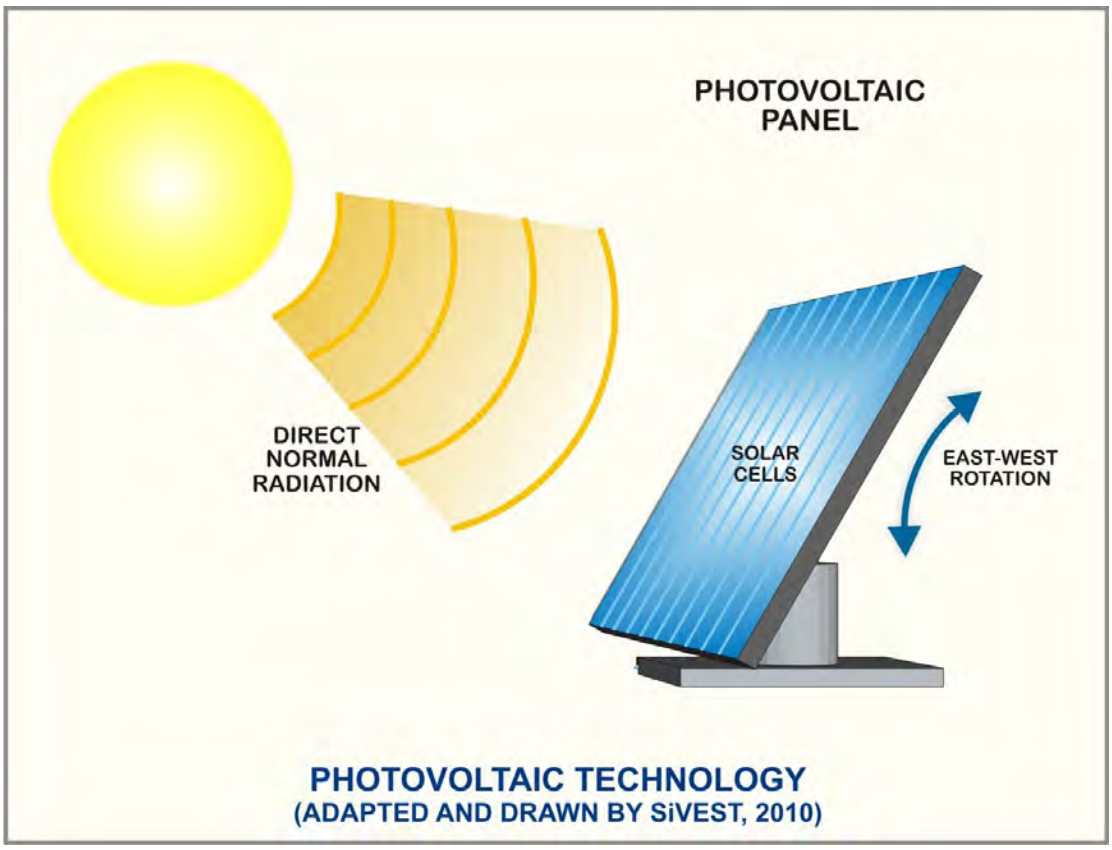

Figure i. Example of a Photovoltaic Panel with tracking capability.

A3 Maps of all smaller maps included in the report are included in Appendix 5.

BIOTHERM ENERGY

PROPOSED CONSTRUCTION OF THE SENDAWO 1 SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY NEAR VRYBURG, NORTH WEST PROVINCE

DRAFT SCOPING REPORT

Executive Summary

BioTherm Energy (Pty) Ltd (hereafter referred to as BioTherm) intends to develop the Sendawo 1 solar photovoltaic (PV) energy facility and associated infrastructure near Vryburg in the North West Province of South Africa. SiVEST Environmental Division has been appointed as independent consultants to undertake the Environmental Impact Assessment (EIA) for the proposed energy facility and associated infrastructure. The overall objective of the project is to generate electricity to feed into the National Grid. The proposed project will consist of a 75MW export capacity solar PV energy facility.

This proposed PV energy facility forms one of three PV energy facilities with a 75MW export capacity that BioTherm are proposing to develop on Portion 1 of the Farm Edinburgh No 735 (Figure i). In order to accommodate the Department of Energy's (DoE) competitive bidding process for procuring renewable energy from Independent Power Producers in South Africa each PV energy facility will be developed under a separate Special Purpose Vehicle (SPV) and therefore each requires a separate Environmental Authorisation. Additionally, BioTherm are proposing to develop the Sendawo substation and a 400kV power line connecting it to the existing Eskom Mookodi Main Transmission Substation (MTS). This associated electrical infrastructure will also require a separate Environmental Authorisation. All three of the Sendawo Solar facilities will be connected to the proposed Sendawo substation. Although each PV energy facility and the electrical infrastructure will be assessed separately, a single public participation process is being undertaken to consider all four proposed developments. The potential environmental impacts associated with all four developments will be assessed as part of the cumulative impact assessment. The reference numbers allocated for the other two proposed PV energy facilities and the substation and power line have not as yet been allocated by the DEA. They will be provided in the Final Scoping Report (FSR).

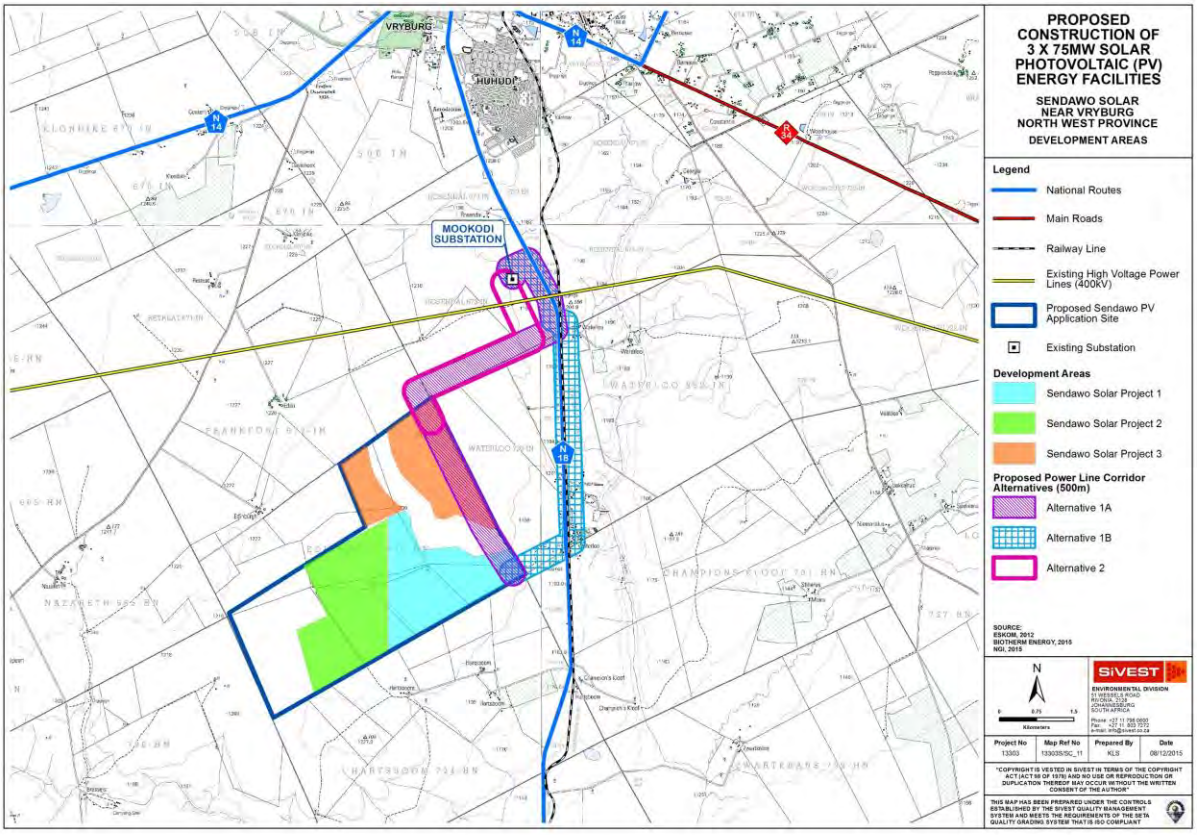

Figure ii: Site locality for the proposed PV energy facilities and 400kV power lines

DEVELOPMENT AREA			
PHASE	**AREA (HECTARES)**	**CENTRE POINT COORDINATES**	
		SOUTH	**EAST**
SENDAWO SOLAR 1 DEVELOPMENT AREA	367.46	S27° 3' 52.625"	E24° 43' 50.328"

Refer to Appendix 8A for the full project coordinates.

The proposed development requires Environmental Authorisation from the Department of Environmental Affairs (DEA). However, the provincial authority will also be consulted (i.e. the North West Department of Rural, Environment and Agricultural Development). The EIA for the proposed development will be conducted in terms of the EIA Regulations promulgated in terms of Chapter 5 NEMA (National Environmental Management Act), which came into effect on the 8th of December 2014. In terms of these regulations, a full EIA is required for the proposed project. All relevant legislations and guidelines (including Equator Principles) will be consulted during the EIA process and will be complied with at all times.

The following assessments were conducted during the Scoping phase to identify and assess the issues associated with the proposed development:

- Biodiversity Assessment
- Avifauna Assessment
- Surface Water Impact Assessment
- Soils and Agricultural Potential Assessment
- Visual Impact Assessment
- Heritage Assessment
- Socio-economic Impact Assessment

These studies were also undertaken to inform the impact assessment to take place in the EIA phase of the project. In the scoping phase the specialists assessed the entire application site (Portion 1 of the Farm Edinburgh No 735) and therefore all three proposed PV energy facilities were assessed in one specialist report. During the EIA phase, the specialist reports will be split into three separate reports which assess site specific impacts of each proposed PV energy facility in detail.

Based on the scoping studies which were conducted, a few potentially sensitive sites have been identified within the study area. These have informed the preliminary assessment of layout alternatives which are included in Chapter 7 and will be further assessed during the EIA phase. The table below summarises the specialist findings of the Scoping Report for the entire project.

Biodiversity	The biodiversity specialist report concludes that there are some issues related to the ecology of the site that could result in potentially significant ecological impacts. The seriousness of many of these impacts can be determined during the field investigation of the site. Some impacts require permits to be issued, either by National or Provincial authorities and field data is required for the permit applications.
Avifauna	The proposed project is located in the endemic region with the fourth highest number of endemics in southern Africa. With 20% of all southern African endemics or near endemics potentially occurring at the core study area and immediate surroundings, the application site and immediate surroundings as a whole should be regarded as moderately sensitive from an avifaunal perspective. Potentially high sensitive, no-go areas were identified in the core study area, i.e. water troughs. Rivers and high voltage lines were identified as potential high sensitive areas in the immediate surroundings, as both these micro-habitats are potential focal points of bird activity. Water troughs (boreholes) could potentially be declassified as high sensitivity should it be confirmed that they will be removed and therefore cease to function as potential focal points for bird activity after the construction of the solar panels. In the case of the existing Mercury-Ferrum 400kV line, the sensitivity and potential no-go areas will only become apparent once a field investigation has been conducted. Should no priority raptor nests be present, there will be no need for buffer zones. However, if

	there are nests present, an appropriate buffer zone will be required around the nest, depending on the species. In the case of a Red Data species such as a Martial Eagle, this would necessitate a buffer zone of at least 1.5km.
Surface water	Database findings revealed that there were no surface water resources, such as rivers and wetlands, located within the study area. Two (2) NFEPA identified rivers, namely the Droe Harts and Korobela, and one (1) WETFEPA identified un-channelled valley bottom wetland were, however, located within relatively close proximity to the study area. Additionally, a large part of the study area was deemed to fall within a CBA 2 area with a small portion also falling within an ESA 1 area, as identified by the North West Province Biodiversity Conservation Assessment, 2009. The desktop findings supported the presence of the two (2) NFEPA identified rivers, namely the Droe Harts and the Korobela, as well as the one (1) artificial un-channelled valley bottom wetland observed in the database findings. However, the desktop assessment findings revealed two (2) segments of the Droe Harts River which were found to pass through the study area. In addition, twelve (12) valley bottom wetlands and twenty two (22) depression wetlands were also identified as part of the desktop assessment. Seventeen (17) of these desktop identified wetlands were located within the study area. It must be noted however, that from a desktop findings perspective, some of these wetland systems appeared to be connected as one greater system while others appeared to be separate isolated systems.
Soils and Agricultural Potential	Virtually all of the study area comprises shallow, calcareous soils with rock (land type Ae36). Coupled with these shallow soils, the low rainfall in the area means that the only means of reliable cultivation would be by irrigation and the Google Earth image of the area shows absolutely no signs of any agricultural infrastructure and certainly none of irrigation. The climatic parameters mean that this part of North West is well suited for grazing but here the grazing capacity is relatively low, around 12 ha/large stock unit. Therefore, the predicted impact is low, as soils are shallow and climate unfavourable for cultivation.
Visual	A scoping-level visual study has been conducted to identify the potential visual impact and issues related to the development of the solar PV energy facility near Vryburg in the North West Province. The study area has a rural visual character with a low to moderate visual sensitivity. However, several solar energy facilities are proposed within relatively close proximity to the proposed PV facility. These facilities and their associated infrastructure, will significantly alter the visual character and baseline in the study area if constructed and make it appear to have a more industrial-type visual character. The proposed PV energy facility development is likely to visually influence twenty-four receptors identified within the visual assessment zone, twenty-one of which are farmsteads, and as such these are regarded to be potentially sensitive visual receptor locations. The sensitivity of the receptor locations will need to be confirmed through further assessment in the next phase of the study. The nature of

	the visual impacts associated with a development of this size on the receptors in the assessment zone could be significant.
Heritage	The proposed Sendawo Solar project may have heritage resources present on the property. This has been confirmed through archival research and evaluation of aerial photography of the sites. Through the analysis of the aerial photographs and available maps of the study area no obvious heritage sensitive areas were identified inside the study area. Some rocky outcrops that could possibly contain rock engravings and open air stone age sites have been identified as possible heritage sensitive areas. The study area is underlain by stromatolitic carbonate rocks (limestones, dolomites) of Early Precambrian (Archaean) age in outcrops of the Ventersdorp Group. Stromatolites are known to occur within these deposits and more modern fossiliferous Caenozoic cave breccias have been recorded associated with carst formation in the dolomite.
Socio-economic	No fatal flaws or contraventions from a socio-economic policy perspective exist for the implementation of the proposed project. The national, provincial, and to some extent local governments, do prioritise the development of renewable energy projects. Although no clear contravention of local policy was identified, it may even be argued that the project will advance the position of Vryburg as a secondary regional centre and primary regional node; it should not interfere with other key development strategies such as the beef beneficiation strategy planned for Vryburg.

Based on the above mentioned studies, the Scoping Report has identified several aspects that warrant further investigation in the EIA Phase. These are as follows:

- Biodiversity Assessment
- Avifauna Impact Assessment (including preconstruction monitoring)
- Surface Water Impact Assessment
- Soils and Agricultural Potential Assessment
- Visual Impact Assessment
- Heritage Assessment
- Socio-economic Impact Assessment

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DRAFT SCOPING REPORT

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Glossary of Terms

Alluvial: Resulting from the action of rivers, whereby sedimentary deposits are laid down in river channels, floodplains, lakes, depressions etc.

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

Cultural Significance: This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

Cumulative Impact: In relation to an activity, cumulative impact means the impact of an activity that in itself may not be significant, but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

"Equator Principles": A financial industry benchmark for determining, assessing and managing social & environmental risk in project financing.

Environmental Impact Assessment: In relation to an application, to which Scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of the application.

Environmental Impact Report: In-depth assessment of impacts associated with a proposed development. This forms the second phase of an Environmental Impact Assessment and follows on from the Scoping Report.

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

Heritage Significance Grades:
a) Grade I: Heritage resources with qualities so exceptional that they are of special national significance;
(b) Grade II: Heritage resources which, although forming part of the national estate, can be considered to have special qualities which make them significant within the context of a province or a region; and
(c) Grade III: Other heritage resources worthy of conservation.

Heritage Resources: This means any place or object of cultural significance. See also archaeological resources above.

Historical Period: Since the arrival of the white settlers - c. AD 1840 - in this part of the country

Iron Age: Period covering the last 1800 years, when new people brought a new way of life to southern Africa. They established settled villages, cultivated domestic crops such as sorghum, millet and beans, and they herded cattle as well as sheep and goats. These people, according to archaeological evidence, spoke early variations of the Bantu Language. Because they produced their own iron tools, archaeologists call this the Iron Age.
Early Iron Age AD 200 - AD 900
Middle Iron Age AD 900 - AD 1300
Late Iron Age AD 1300 - AD 1830

Kilovolt (kV): a unit of electric potential equal to a thousand volts (a volt being the standard unit of electric potential. It is defined as the amount of electrical potential between two points on a conductor carrying a current of one ampere while one watt of power is dissipated between the two points).

Precipitation: Any form of water, such as rain, snow, sleet, or hail that falls to the earth's surface.

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

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

Scoping Report: An “issues-based” report which forms the first phase of an Environmental Impact Assessment process.

Stone Age: The first and longest part of human history is the Stone Age, which began with the appearance of early humans between 3-2 million years ago. Stone Age people were hunters, gatherers and scavengers who did not live in permanently settled communities. Their stone tools preserve well and are found in most places in South Africa and elsewhere.
Early Stone Age 2 000 000 - 150 000 Before Present
Middle Stone Age 150 000 - 30 000 BP
Late Stone Age 30 000 - until c. AD 200

List of Abbreviations

AP	- Action Plan
BID	- Background Information Document
CARA	- Conservation of Agricultural Resources Act
CBA	- Critical Biodiversity Area
CISPR	- International Special Committee of Radio Interferences
CSP	- Concentrated Solar Power
DEA	- Department of Environmental Affairs
DSR	- Draft Scoping Report
DoE	- Department of Energy
DM	- District Municipality
DWS	- Department of Water and Sanitation
EAP	- Environmental Assessment Practitioner
ECA	- Environmental Conservation Act No 73 of 1989
EHS	- Environmental, Health, and Safety
EIA	- Environmental Impact Assessment
EIR	- Environmental Impact Report
EMPr	- Environmental Management Programme
EMI	- Electromagnetic Interference
EP	- Equator Principles
EPFI	- Equator Principles Financial Institutions
ERA	- The Electricity Regulation Act No. 4 of 2006
ESA	- Ecological Support Area
FGM	- Focus Group Meeting
FSR	- Final Scoping Report
GDP	- Gross Domestic Product
GIIP	- Good International Industry Practice
GIS	- Geographic Information System
GW	- Gigawatts
HIA	- Heritage Impact Assessment
I&AP(s)	- Interested and Affected Parties
IBA(s)	- Important Bird Area(s)
IDP	- Integrated Development Plan
IEP	- Integrated Energy Plan
IFC	- International Finance Corporation
IPP(s)	- Independent Power Producers
IRP	- Integrated Resource Plan
IUCN	- International Union for the Conservation of Nature and Natural Resources
KSW	- Key Stakeholder Workshop
kV	- Kilo Volt

LM	- Local Municipality
MSA	- Middle Stone Age
MW	- Megawatt
NEA	- The National Energy Act No. 34 of 2008
NEMA	- National Environmental Management Act No. 107 of 1998
NEMBA	- National Environmental Management: Biodiversity Act No. 10 of 2004
NHRA	- National Heritage Resources Act No. 25 of 1999
NSBA	- National Spatial Biodiversity Assessment
NWA	- National Water Act No. 36 of 1998
NEMAA	- National Environmental Management: Air Quality Act of 2004
NPAES	-National Parks Area Expansion Strategy
OHSA	- Occupational Health and Safety Act No. 85 of 1993
PoS	- Plan of Study
PM	- Public Meeting
PPA	- Power Purchase Agreement
PPP	- Public Participation Process
PV	- Photovoltaic
RFI	- Radio Frequency Interference
RFP	- Request for Proposals
RFQ	- Request for Qualifications
SA	- South Africa
SAHRA	- South African Heritage Resources Agency
SALT	- Southern African Large Telescope
SANBI	- South African National Biodiversity Institute
SDF	- Spatial Development Framework
SKA	- Square Kilometre Array
SPVs	- Special Purpose Vehicles
TL	- Terrain Loss
WETFEPA	- Wetland Freshwater Priority Areas

BIOTHERM ENERGY

PROPOSED CONSTRUCTION OF THE SENDAWO 1 SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY NEAR VRYBURG, NORTH WEST PROVINCE

DRAFT SCOPING REPORT

1 INTRODUCTION

BioTherm Energy (Pty) Ltd (hereafter referred to as BioTherm) intends to develop the Sendawo 1 solar photovoltaic (PV) energy facility and associated infrastructure near Vryburg in the North West Province of South Africa. SiVEST Environmental Division has been appointed as independent consultants to undertake the Environmental Impact Assessment (EIA) for the proposed energy facility and associated infrastructure. The overall objective of the project is to generate electricity to feed into the National Grid. The proposed project will consist of a 75MW export capacity solar PV energy facility.

This proposed PV energy facility forms one of three PV energy facilities with a 75MW export capacity that BioTherm are proposing to develop on Portion 1 of the Farm Edinburgh No 735 (Figure 1). In order to accommodate the Department of Energy's (DoE) competitive bidding process for procuring renewable energy from Independent Power Producers in South Africa each PV energy facility will be developed under a separate Special Purpose Vehicle (SPV) and therefore each requires a separate Environmental Authorisation. Additionally, BioTherm are proposing to develop the Sendawo substation and a 400kV power line connecting it to the existing Eskom Mookodi Main Transmission Substation (MTS). This associated electrical infrastructure will also require a separate Environmental Authorisation. All three of the Sendawo Solar facilities will be connected to the proposed Sendawo substation. Although each PV energy facility and the electrical infrastructure will be assessed separately, a single public participation process is being undertaken to consider all four proposed developments. The potential environmental impacts associated with all four developments will be assessed as part of the cumulative impact assessment. The reference numbers allocated for the other two proposed PV energy facilities and the substation and power line have not as yet been allocated by the DEA. They will be provided in the Final Scoping Report (FSR).

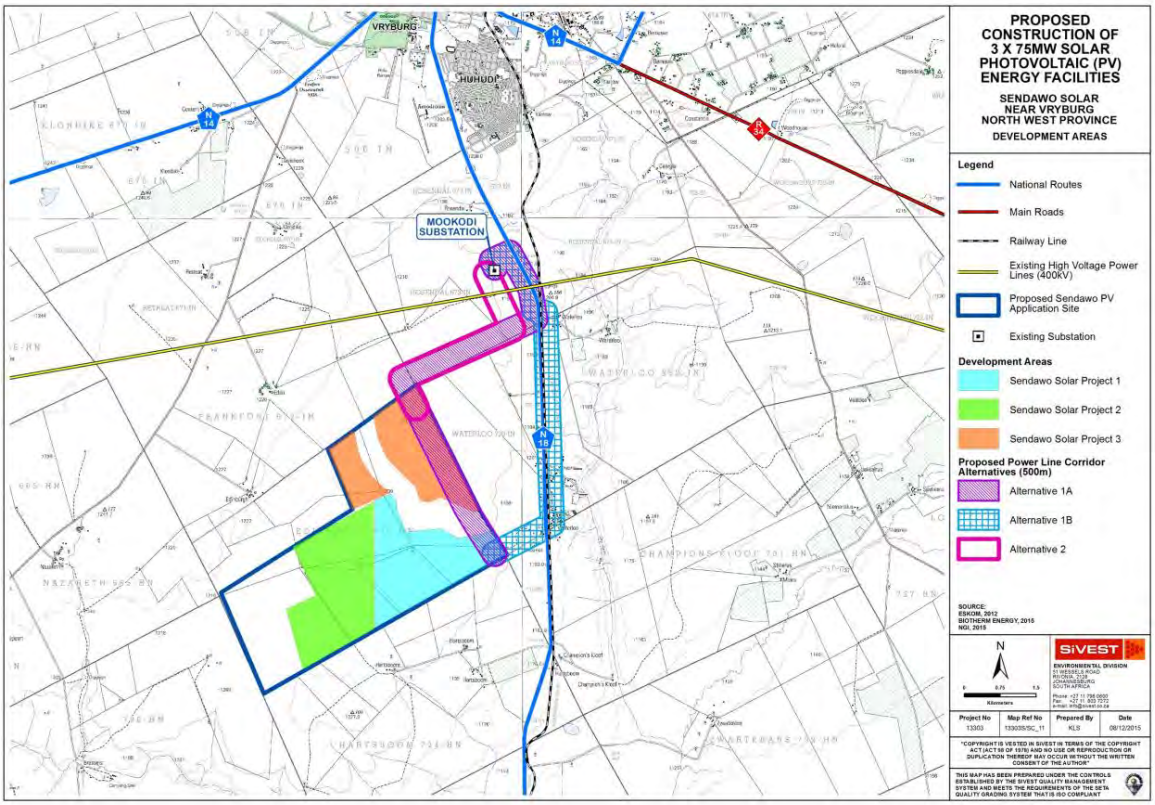

Figure 1: Site locality for the proposed PV energy facilities and 400kV power lines

The proposed development requires Environmental Authorisation from the Department of Environmental Affairs (DEA). However, the provincial authority will also be consulted (i.e. the North West Department of Rural, Environment and Agricultural Development). The EIA for the proposed development will be conducted in terms of the EIA Regulations promulgated in terms of Chapter 5 NEMA (National Environmental Management Act), which came into effect on the 8th of December 2014. In terms of these regulations, a full EIA is required for the proposed project. All relevant legislations and guidelines (including Equator Principles) will be consulted during the EIA process and will be complied with at all times.

As previously mentioned, this Scoping Report is compiled in accordance with the Equator Principles (EP), which is a financial industry benchmark for determining, assessing and managing social and environmental risk in project financing (Equator Principles, 2013). This proposed development is considered a Category B project, which are those with potential limited adverse social or environmental impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures (Equator Principles, 2013). The project will also comply with the International Finance Corporation's (IFC) Social and Environmental Performance Standards (2012) and General Environmental Health and Safety (EHS) Guidelines (2007)..

1.1 Objectives of the Scoping Phase

The NEMA EIA Regulations (GN. R. 982) state that the objective of the scoping phase is to:

(a) identify the relevant policies and legislation relevant to the activity;
(b) motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
(c) identify and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking process;
(d) identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;
(e) identify the key issues to be addressed in the assessment phase;
(f) agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and
(g) identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

A scoping report must contain the information that is necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process. The content requirements for a Scoping Report, as well as details of which section of the report fulfils these requirements, are shown in **Table 1** below.

Table 1: Content requirements for a Scoping Report

Content Requirements	Applicable Section
(a) details of- (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae;	Details of the EAP and full project team are included in section 1.5 on page 8. The expertise (including curriculum vitae) of the EAP and full project team are include in Appendix 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;	The location of the proposed project is detailed in on page *i* of the report, as well as in section 5.2 on page 38.

(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	
(c) a plan which locates the proposed activity or activities applied for 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;	A map of the regional locality is shown in section 5.1 on page 37, and the site locality is shown in section 5.2 on page 38. Additionally, all project maps are included in Appendix 5. Coordinates are shown on page *i* of the report, as well as in section 5.2 on page 38
(d) a description of the scope of the proposed activity, including- (i) all listed and specified activities triggered; (ii) a description of the activities to be undertaken, including associated structures and infrastructure;	The listed and specified activities triggered as per NEMA are detailed in section 3.1.2 on page 17. The technical project description is included in section 2 on page 9. This includes a description of activities to be undertaken, including associated structures and infrastructure.
(e) a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process;	A description of all legal requirements and guidelines is provided in section 3 on page 17. This includes key legal and administrative requirements as well as key development strategies and guidelines.
(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;	The need and desirability of the proposed project is discussed in section 4 on page 34.
(h) a full description of the process followed to reach the proposed preferred activity, site and location within the site, including - (i) details of all the alternatives considered; (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (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;	A description of the alternatives considered in terms of the Regulations is included in section 2.4 on page 15. A preliminary assessment of layout alternatives is included in section 7 on page 106. The public participation process followed is detailed in section 8 on page 119. Additionally, all public participation documents are included in Appendix 7. This includes a

(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (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; (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (viii) the possible mitigation measures that could be applied and level of residual risk; (ix) the outcome of the site selection matrix; (x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	summary of issues raised by I&APs, and the responses to their comments. A full description of the environmental attributes within the application site is included in section 5 on page 37. The impacts and risks associated with each alternative are assessed in section 7 on page 106. The methodology used in identifying the impacts and risks associated with each alternative is included in section 7 on page 106. The positive and negative impacts that the proposed activity will have on the environment are discussed in section 6.1 on page 85. Potential mitigation measures are included in section 6.2 on page 104. The outcome of the site selection matrix is included in section 4.4 on page 35. The inclusion of alternatives is discussed in section 2.4 on page 15, and in section 7 on page 106. A concluding statement indicating the preferred alternatives is contained in section 7 on page 106.
(i) a plan of study for undertaking the environmental impact assessment process to be undertaken, including- (i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity; (ii) a description of the aspects to be assessed as part of the environmental impact assessment process; (iii) aspects to be assessed by specialists; (iv) a description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists; (v) a description of the proposed method of assessing duration and significance;	The plan of study for the EIA phase is included in section 11 on page 144. A description of alternatives to be considered is included in section 11.8 on page 158. A summary of the aspects to be assessed is included in section 11.1 on page 144 and in section 11.3 on page 145. The description of the proposed EIA phase methodology is in section 11.3 on page 145. An indication of planned authority consultation is contained in section 11.2 on page 145. The particulars of the planned public

(vi) an indication of the stages at which the competent authority will be consulted; (vii) particulars of the public participation process that will be conducted during the environmental impact assessment process; and (viii) a description of the tasks that will be undertaken as part of the environmental impact assessment process; (ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.	participation process are included in section 11.10 on page 160. All tasks to be undertaken during the EIA phase are described in section 11 on page 144. Detailed mitigation measures will be included in the EIA phase of the project, following detailed specialist studies, as indicated in section 11.9 on page 160.
(j) an undertaking under oath or affirmation by the EAP in relation to- (i) the correctness of the information provided in the report; (ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and (iii) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	The EAP declaration is included in Appendix 3.
(k) an undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties (I&APs) on the plan of study for undertaking the environmental impact assessment;	The plan of study is included within this DSR which has been made available for review and comment by I&APs. Should any I&APs identify any issues or concerns with respect to the plan of study for undertaking the EIA, it will be updated accordingly.
(l) where applicable, any specific information required by the competent authority; and	At this stage there is no specific information required by the competent authority. However a record of authority consultation is kept in section 1.4 on page 8, and should there be any specific information requested, this will be detailed in the same section.
(m) any other matter required in terms of section 24(4)(a) and (b) of the Act.	All requirements in terms of section 24(4)(a) and (b) of the Act have been met in this report.

1.2 Applicable Documentation

The following documentation should be read in conjunction with this Scoping Report:

- "Equator Principles" 2013
- International Finance Corporation's (IFC) Performance Standards on Social and Environment, January 2012, namely:
    - Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts
    - Performance Standard 2: Labour and Working Conditions
    - Performance Standard 3: Resource Efficiency and Pollution Prevention
    - Performance Standard 4: Community Health, Safety and Security
    - Performance Standard 5: Land Acquisition and Involuntary Resettlement
    - Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
    - Performance Standard 7: Indigenous Peoples
    - Performance Standard 8: Cultural Heritage
- International Finance Corporation – World Bank Guidelines, General Environmental Health and Safety (EHS) Guidelines 2007.

The EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). These EHS Guidelines are applied as required by the World Bank's respective policies and standards. These General EHS Guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines which provide guidance to users on EHS issues in specific industry sectors. The IFC handbook is contained in Appendix 1.

1.3 Specialist Studies

Specialist studies have been conducted in terms of the stipulations contained within Appendix 6 of the 2014 NEMA EIA regulations.

The following specialist studies have been conducted to assess the site:

- Biodiversity Assessment
- Avifauna Assessment (including preconstruction monitoring)
- Surface Water Impact Assessment
- Soils and Agricultural Potential Assessment
- Visual Impact Assessment
- Heritage Assessment
- Socio-economic Assessment

These studies have been used to identify issues at a scoping level and will be supplemented with more site specific studies during the EIA phase of the project. Key issues relating to the proposed site are discussed below in section 5.

1.4 Authority Consultation

The National Department of Environmental Affairs (DEA) is the competent authority on this project. As such an application for environmental authorisation (EA) for the proposed development was submitted to DEA on the 5th of January 2016. A proof of payment, details of the EAP and declaration of interest, a project schedule, details of landowners, and locality map formed part of the application form and were submitted accordingly on the same date. This DSR was submitted to the DEA on the same day that the application was submitted and following the allocation of the DEA reference number this will be included in the FSR.

1.5 Expertise of Environmental Assessment Practitioner

SiVEST has considerable experience in the undertaking of EIAs. Staff and specialists who have worked on this project and contributed to the compilation of this Scoping Report are detailed in **Table 2** below.

Table 2: Project Team

Name and Organisation	Role
Rebecca Thomas – SiVEST	Internal Peer Reviewer
Andrea Gibb – SiVEST	Environmental Assessment Practitioner (EAP) and Visual
Lynsey Rimbault – SiVEST	Environmental Consultant / Public Participation Practitioner
Stephan Jacobs - SiVEST	Environmental Consultant / Public Participation Practitioner, Visual and Surface Water
David Hoare – David Hoare Consulting	Biodiversity
Chris van Rooyen – Chris van Rooyen Consulting	Avifauna
Shaun Taylor – SiVEST	Surface Water
D.G. Paterson – ARC Institute for Soil, Climate and Water	Agricultural Potential
Wouter Fourie – PGS	Heritage
Elena Broughton and Mariette Steynberg – Urban-Econ Development Economists	Socio-economic
Nicolene Venter – Zitholele Consulting	Senior Public Participation Practitioner
Kerry Schwartz – SiVEST	GIS and Mapping and Visual

Please refer to attached CV's for more information in Appendix 2. Declarations of independence of each specialist are contained in Appendix 3.

1.6 Draft Scoping Report Structure

This Draft Scoping Report (DSR) is structured as follows:

- Chapter 1 introduces the project and explains the objectives of the Scoping phase. The chapter also outlines the relevance of the Equator Principles as well as the IFC Performance Standards and points out the specialist studies for the project. It describes the authority consultation thus far. Furthermore, the chapter discusses the experience of the Environmental Assessment Practitioners (EAP), including specialists, who have contributed to the report.
- Chapter 2 presents the technical description of the project, including a description of alternatives being considered.
- Chapter 3 expands on the relevant legal ramifications applicable to the project and describes relevant development strategies and guidelines.
- Chapter 4 provides explanation to the need and desirability of the proposed project.
- Chapter 5 provides a description of the region in which the proposed development is intended to be located. Although the chapter provides a broad overview of the region, it is also specific to the application. It contains descriptions of the site and the specialist studies are also summarised.
- Chapter 6 identifies potential impacts associated with the proposed solar PV energy facility. The chapter further identifies these impacts per specialist study and discusses potential cumulative impacts.
- Chapter 7 discusses layout alternatives, including how they relate to sensitive areas identified by specialists and provides a preliminary comparison of alternatives.
- Chapter 8 describes the Public Participation Process (PPP) undertaken during the Scoping Phase and tables issues and concerns raised by Interested and Affected Parties (I&APs).
- Chapter 9 provides an assessment of the report in terms of the Equator Principles.
- Chapter 10 provides a conclusion to the DSR and recommendations to be addressed in further assessment.
- Chapter 11 describes the environmental impact reporting phase of the EIA (i.e. the way forward for this study and includes the Plan of Study for EIA).
- Chapter 12 lists references indicated in the DSR.

2 TECHNICAL DESCRIPTION

The proposed project will encompass the installation of a solar PV field and associated components, in order to generate electricity that is to be fed into the Eskom grid. The facility will have a maximum export capacity of 75MW. The total area of the solar PV array has not been determined and will be determined

during the EIA phase, however the total area of the application site is 1709 hectares, with the proposed Sendawo 1 development area taking up 367 ha. The 75MW energy facility layout will require approximately 350 ha. The footprint of the Operations and Maintenance (O&M) buildings will be approximately 225m^2 and the onsite switching substation will occupy a footprint area of 2.25 ha. The final design details are yet to be confirmed. These details will become available during the detailed design phase of the project. During the scoping phase the entire application site has been assessed in order to inform the preliminary comparison of layout alternatives for the solar PV energy facility. These layout alternatives have been discussed in Chapter 7 and are presented in the Plan of Study for the EIA Phase (Chapter 11). The voltage of the connection lines from the solar PV energy facility substation to the grid is likely to be 132kV.

2.1 PV Project Components

BioTherm is proposing the establishment of a solar PV energy facility on the development site near Vryburg (**Figure 2**). As mentioned, the objective of the solar project is to generate electricity to feed into the national grid. The solar PV energy facility will have a maximum export capacity of 75MW.

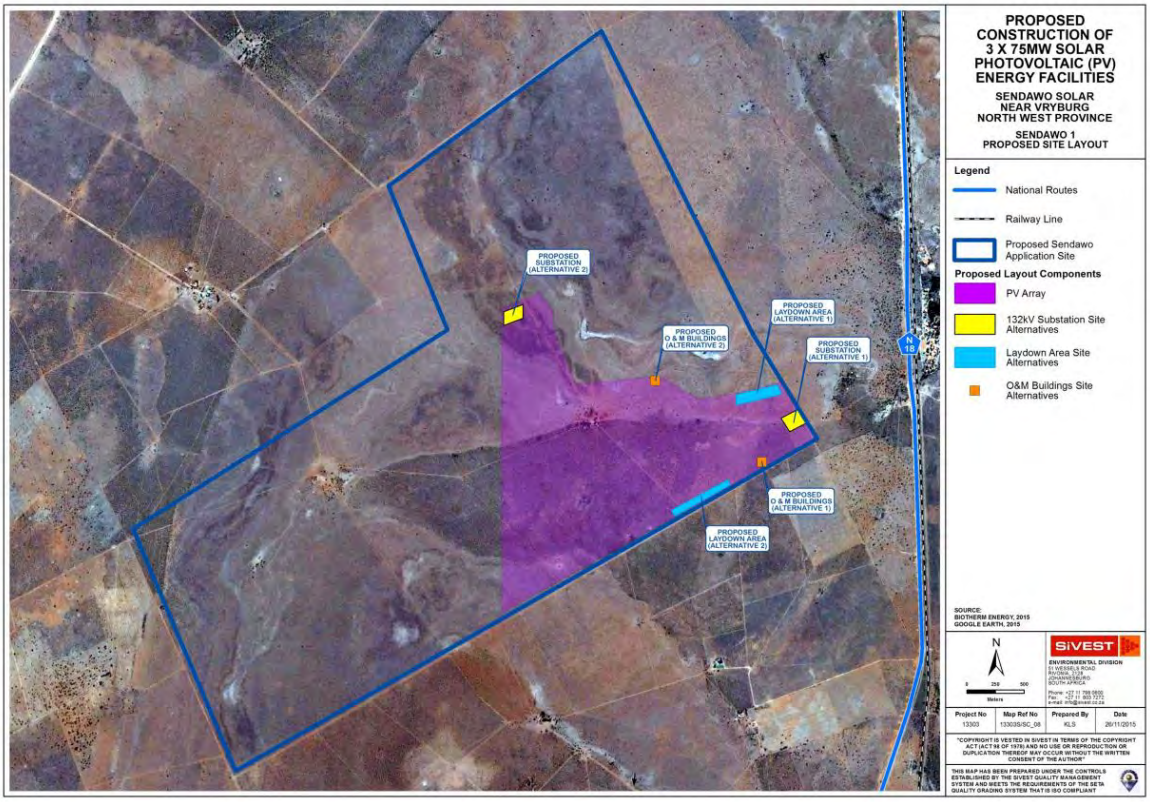

Figure 2: Proposed solar PV energy facility study area

The key technical details and infrastructure required is presented in the table below (**Table** 3).

Table 3: Sendawo 1 technical summary

Phase Name	Farm name and area	Technical details and infrastructure necessary for each phase
Sendawo 1	Portion 1 of the Farm Edinburgh No 735 Sendawo 1 PV Site Area: 367 ha	▪ Approximately 275 000 **solar PV panels** with a total export capacity of 75MW; ▪ Panels will be either **fixed axis mounting or single axis tracking solutions**, and will be either crystalline silicon or thin film technology; ▪ Onsite **switching substation**, with the transformers for voltage step up from medium voltage to high voltage; ▪ The onsite **switching substation** will occupy an area of approximately 2.25ha. ▪ The panels will be connected in strings to inverters. Inverter stations will house 2 inverters and 1 transformer; ▪ DC power from the panels will be converted into AC power in the inverters and the voltage will be stepped up to 22-33kV (medium voltage) in the transformers. ▪ The **22-33kV cables** will be run underground in the facility to a common point before being fed to the **onsite switching substation** where the voltage will typically be stepped up to 132kV. ▪ Grid connection is to the Mookodi Main Transmission Substation (MTS) via the proposed Sendawo substation (part of a separate on-going EIA process). The proposed Sendawo substation will have grid transformers fot voltage step up to 400kV, which will enable the connection multiple projects to the Mookodi MTS. ▪ A **power line** with a voltage of 132kV is proposed and will run from the onsite substation to the proposed Sendawo substation. The proposed 400kV power line which will connect the proposed Sendawo substation to the Mookodi MTS is part of a separate on-going EIA process.. ▪ The onsite **power line** will be a tower (suspension / strain) / Steel monopole structure, which may be self-support or guyed suspension. The height will vary based on the terrain, but will ensure minimum OHL line clearances with buildings and surrounding infrastructure. The minimum vertical clearances will be 3.8m with building and 6.7m between conductors and ground ▪ A **lay-down area** of approximately 5ha for the temporary storage of materials during the construction activities. ▪ **Access roads and internal roads**; ▪ Construction of a **car park and fencing** around the project; and ▪ **Administration, control and warehouse buildings**

As previously mentioned, this proposed PV energy facility forms one of three PV energy facilities with a 75MW export capacity that BioTherm are proposing to develop on Portion 1 of the Farm Edinburgh No 735. In order to accommodate the Department of Energy's (DoE) competitive bidding process for procuring renewable energy from Independent Power Producers in South Africa each PV energy facility will be developed under a separate Special Purpose Vehicle (SPV) and therefore each requires a separate Environmental Authorisation. Additionally, BioTherm are proposing to develop the Sendawo substation and a 400kV power line connecting it to the existing Eskom Mookodi Main Transmission Substation (MTS). All three of the Sendawo Solar facilities will be connected to the proposed Sendawo substation.

2.2 Solar Field

Solar PV panels are usually arranged in rows consisting of a number of PV panels. The area required for the PV arrays will likely need to be entirely cleared or graded. Where tall vegetation is present, this vegetation will be removed from the PV array area.

Approximately 275 000 solar PV panels will be required for the facility for a total export capacity of 75MW. Support structures will either be fixed tilt mounting or single axis tracking solutions, and the modules will be either crystalline silicon or thin film technology. The solar PV panels are variable in size, and are affected by advances in technology between project inception and project realisation. At this stage it is likely that the dimensions of solar panels will be 1956mm x 992mm x 40mm. The actual size of the PV panels to be used will be determined in the final design stages of the project. The PV panels are mounted onto metal frames which are usually aluminium. Concrete or rammed pile foundations are commonly used to support the PV modules (**Figure 3**).

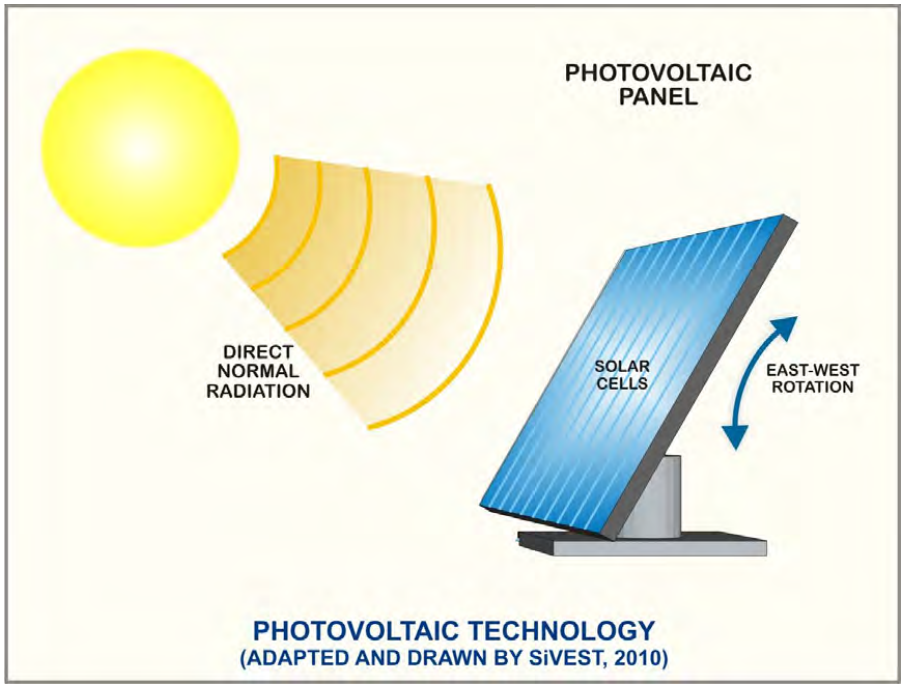

Figure 3: Example of a Photovoltaic Panel with tracking capability.

2.3 Associated Infrastructure

2.3.1 Electrical Infrastructure

The solar PV panel arrays are connected to each other in strings, which are in turn connected to inverters. For a 75MW size facility, typically 2MW inverter stations which are containerised stations housing 2 inverters and 1 transformer will be used (**Figure 4**). DC power from the panels will be converted into AC power in the inverters and the voltage will be stepped up to 22 or 33kV (medium voltage) in the transformers. The 22 or 33kV cables will be run underground within the facility to a common point before being fed to the onsite substation where the voltage will typically be stepped up to 132kV. An onsite power line with a voltage of up to 132kV will run from the onsite substation to the proposed Sendawo substation. The 132kV power line will be a tower (suspension / strain) / Steel monopole structure, which may be self-support or guyed suspension. The height will vary based on the terrain, but will ensure minimum OHL line clearances with buildings and surrounding infrastructure. The minimum vertical clearances will be 3.8m with building and 6.7m between conductors and the ground.

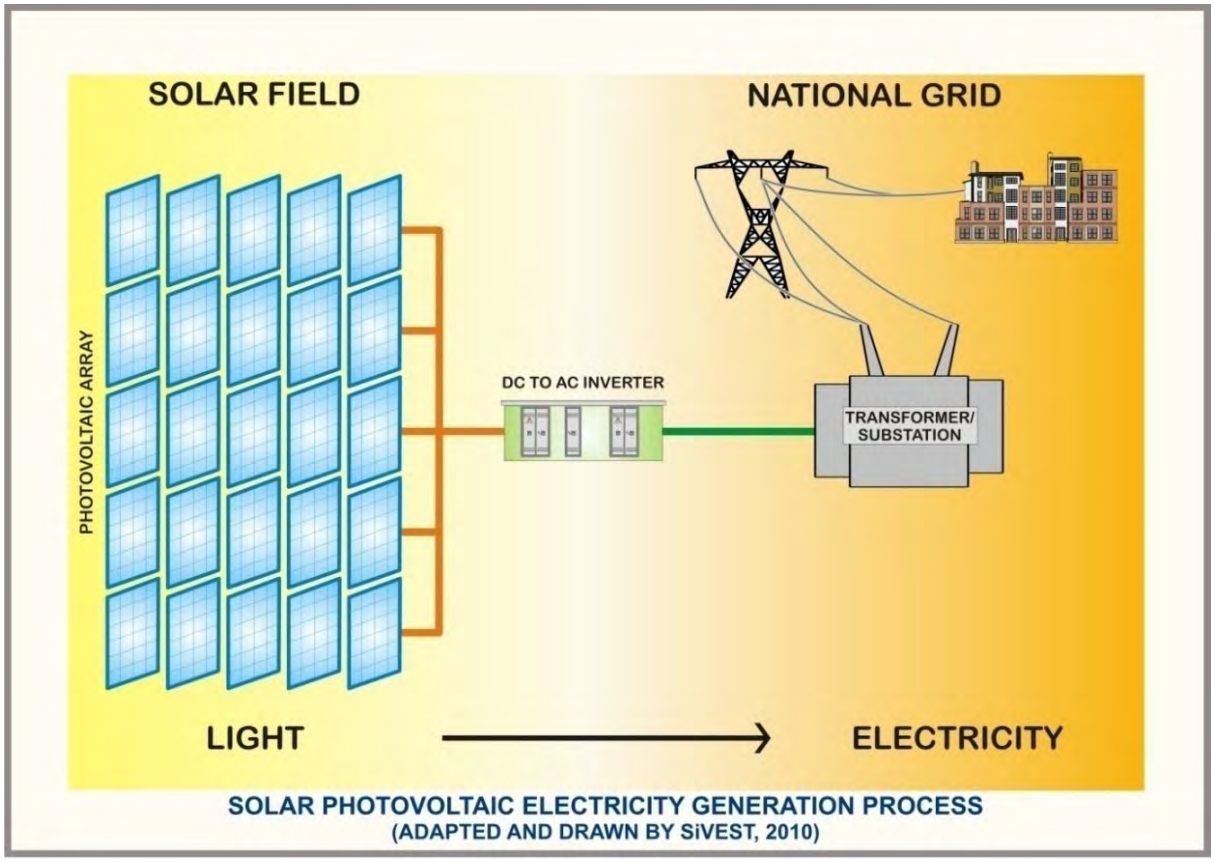

Figure 4: PV process

2.3.2 Buildings

The solar field will require onsite buildings which will be used in the daily operation of the plant and includes an administration building (office). Potential locations for the administration building will be determined at a later stage during the EIA process based on any environmental constraints identified and design factors that need to be considered. The buildings will likely be single storey buildings which will be required to accommodate the following:

- Control room
- Workshop
- Kitchen
- Toilets
- Storage
- Car park and fencing around the project

2.3.3 Construction Lay-down Area

A general construction lay-down area will be required for the construction phase of the proposed solar PV energy facility. The size of this area is yet to be determined, but 5 hectares is likely. A permanent laydown for the containers will be required for the storage of spares, which is to be located close to the O&M building. Approximately 6, 3x12m containers will be required

2.3.4 Other Associated Infrastructure

Other associated infrastructure includes the following:

- Access roads and internal roads;
- A car park; and
- Fencing around the project which is likely to be galvanized steel type at approximately 2m high.

2.4 Alternatives

As per Chapter 1 of the EIA regulations (2014), feasible and reasonable alternatives are required to be considered during the EIA process. Alternatives are defined at "different means of meeting the general purpose and requirements of the activity" These alternatives may include:

(a) The property on which or location where it is proposed to undertake the activity;
(b) The type of activity to be undertaken;
(c) The design or layout of the activity;
(d) The technology to be used in the activity;
(e) The operational aspects of the activity; and
(f) The option of not implementing the activity.

Each of this alternatives is discussed in relation to the proposed project in the sections below.

2.4.1 The property on which or location where it is proposed to undertake the activity;

No site alternatives for this project are being considered because the placement of solar PV installations is dependent on several factors, all of which are favourable at the proposed site location. These include solar resource, climate, topography, grid connections and access to the site. The project site has been identified by BioTherm through a pre-feasibility desktop analysis based on the estimation of the solar energy resource as well as weather, dust and dirt effects. The North West Province in South Africa has the highest solar irradiation potential after the Northern Cape. The project site receives an annual global horizontal irradiation of approximately 2194 kWh/ m^2/year. The project site has access to the national grid via the existing Mookodi Main Transmission Station located approximately 2.7 km from the site. There are no operational projects proposed by other developers which surround the site. The project site has a relatively flat topography which is suitable for the development of a solar PV facility. The project site is easily accessible as the tarred N18 national road lies adjacent to site that connects to the

N14 and leads to Vryburg. The site is therefore considered highly suitable for the proposed development and no other locations are being considered.

2.4.2 The type of activity to be undertaken;

No other activity alternatives are being considered. Renewable energy development in South Africa is highly desirable from a social, environmental and development point of view. Wind energy installations are not feasible on the site as there is not enough of a wind resource. Concentrated solar power (CSP) installations are also not feasible because they have a high water requirement and the project site is located in an arid area. Therefore solar PV is the only activity being considered for the proposed site.

2.4.3 The design or layout of the activity;

Design or layout alternatives are being considered in the EIA process. Various environmental specialists assessed the site during the scoping phase. Their assessments encompassed the entire proposed development site and included the identification of sensitive areas. These sensitive areas were used during the scoping phase to perform a preliminary comparison of layout alternatives (Chapter 7). These layouts will be extensively investigated in the EIA phase of the project (see the plan of study for the EIA phase in Chapter 11 of the DSR). The design and layout alternatives will include alternative locations for the laydown areas, onsite substations, and O&M buildings. The layout alternatives will be based on both environmental constraints and design factors. The EIA phase layout alternatives, including maps, are presented in Chapter 11.

2.4.4 The technology to be used in the activity;

There are very few technological alternatives for PV technology. For the Sendawo 1 solar energy facility the mounting structures will be either fixed axis mounting or single axis tracking solutions, and the modules will be either crystalline silicon or thin film technology. The impacts on the environment of the different types of PV technology are the same during construction, operation and decommissioning. Therefore no technology alternatives will be considered during the EIA. The choice of technology used will ultimately be determined by technological and economic factors at a later stage.

2.4.5 The operational aspects of the activity; and

No operational alternatives were assessed in the EIA, as none are available for solar PV installations.

2.4.6 The option of not implementing the activity.

The option of not implementing the activity, or the **'no-go'** alternative, is considered in the EIA. South Africa is under immense pressure to provide electricity generating capacity in order to reduce the current electricity demand in the country. With the global focus on climate change, the government is under severe pressure to explore alternative energy sources in addition to coal-fired power stations. Although

solar power is not the only solution to solving the energy crisis in South Africa, not establishing the proposed solar PV energy facility would be detrimental to the mandate that the government has set to promote the implementation of renewable energy. It is a suitable sustainable solution to the energy crisis and this project could contribute to addressing the problem. This project will aid in achieving South Africa's goals in terms of sustainability, energy security, mitigating energy cost risks, local economic development and national job creation.

3 LEGAL REQUIREMENTS AND GUIDELINES

3.1 Key Legal and Administrative Requirements Relating to the Proposed Development

3.1.1 National Environmental Management Act No. 107 of 1998 – NEMA EIA Requirements

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

- co-operative environmental governance by establishing principles for decision-making on matters affecting the environment;
- institutions that will promote co-operative governance and procedures for coordinating environmental functions exercised by organs of state;
- to provide for the prohibition, restriction or control of activities which are likely to have a detrimental effect on the environment;
- and to provide for matters connected therewith.

NEMA now governs the EIA process with the recent promulgation of the new EIA regulations in December 2014 (Government Gazette No. 38282 of 4th December 2014).

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

In terms of the newly released EIA Regulations promulgated in terms of Chapter 5 NEMA (National Environmental Management Act), which came into effect on 8th December 2014, a full EIA is required for the proposed project.

3.1.2 NEMA EIA Requirements

Sections 24 and 44 of NEMA make provision for the promulgation of regulations that identify activities which may not commence without an environmental authorisation, the result being that NEMA now governs the EIA process with the said promulgation of EIA Regulations in December 2014 (Government

Gazette No. 38282 of 04 December 2014). This EIA has therefore been undertaken in accordance with the NEMA EIA 2014 Regulations which are contained in four Government Notices (GN R 982, 983, 984, and 985) which came into effect on 8th December 2015.

In terms of these Regulations, a full Environmental Impact Assessment is required for the proposed development based on triggered activities. However, several activities which trigger a basic assessment were also identified and need also be specified. Ultimately, these activities will not form a separate assessment, but will fall into the greater EIA.

The following Schedules of the Government Notice No. R. 983 – 985 of the 4th December 2015 are of relevance to the project in question. All of the Listed Activities identified in terms of Sections 24(2) and 24D include:

Table 4: Listed activities in terms of the NEMA Regulations

Activity number of the relevant notice:	**Listed activity as described in GNR 983, 984 and 985**	**Description of Listed Activity**
GN R. 983 Item 11	*The development of facilities or infrastructure for the transmission and distribution of electricity-* *(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts*	**Power lines are proposed to connect the PV energy facility to the proposed Sendawo Substation. The proposed power lines will be located outside an urban area and will have a capacity of 132kV.**
GN R. 983 Item 12	*The development of :* *x) buildings exceeding 100 square metres in size;* *xii) infrastructure or structures with a physical footprint of 100 square metres or more;* *where such development occurs-* *(a) within a watercourse;* *(b) in front of a development setback; or* *(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;*	**The proposed project will entail the development of buildings and other infrastructure exceeding 100 square metres in size. The scoping phase surface water assessment revealed that there are surface water features located on the proposed site. The proximity of the proposed development footprint to watercourses will be determined during the EIA phase once final layouts have been selected and after detailed specialist studies have been undertaken.**
GN R. 983 Item 19	*The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from-* *(i) a watercourse;* *But excluding where such infilling, depositing , dredging, excavation, removal or moving-*	**The scoping phase surface water assessment revealed that there are surface water features located on the proposed site. The proximity of the proposed development footprint to watercourses will be determined during the EIA phase once final layouts have been selected and after detailed specialist studies have been undertaken. Should construction activities take place within a watercourse soil is likely to be removed**.

	(a) will occur behind a development setback; *(b) is for maintenance purposes undertaken in accordance with a maintenance management plan; or* *(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies.*	
GN R. 983 Item 24	*The development of-* *ii) a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;*	**On site roads will be required for the proposed development. The width of these roads will be determined during the EIA phase.**
GN R. 983 Item 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;* *excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.*	**The proposed project site is currently used for cattle and game farming, and the proposed project will result in an area greater than 1 hectare being transformed into an industrial land use.**
GN R. 983 Item 56	*The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre -* *(i) where the existing reserve is wider than 13,5 meters; or* *(ii) where no reserve exists, where the existing road is wider than 8 metres –* *excluding where widening or lengthening occur inside urban areas.*	**It is likely that existing access roads will need to be upgraded in order to access the site. The required width and length of the expansion will be determined during the EIA process.**
GN R. 984 Item 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 of facilities or infrastructure is for photovoltaic installations and occurs* *(a) within an urban area; or* *(b) on rooftops.";*	**It is proposed that a solar PV energy facility with a maximum export capacity of 75MW will be constructed.**
GN R. 984 Item 15	*The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such*	**The proposed development will transform more than 20 hectares of undeveloped, vacant or derelict land to industrial use (solar PV energy facility). The proposed**

	clearance of indigenous vegetation is required for- *(i) the undertaking of a linear activity; or* *(ii) maintenance purposes undertaken in accordance with a maintenance management plan.*	**development area for Sendawo 1 is 367 ha. The exact area of the proposed PV array will be determined at a later stage during the EIA.**
GN R. 985 Item 4	The development of a road wider than 4 metres with a reserve less than 13,5 metres. *(e) In the North West Province* *i Outside urban areas, in:* *(bb) National Protected Area Expansion Strategy Focus areas;* *(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;* *(ee) Critical biodiversity areas (Terrestrial Type 1 and 2) as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;* *(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from a biosphere reserve; or*	**Internal roads will be constructed and these are planned to be 5m wide. The proximity of the proposed project to protected areas will be determined at a later stage of the EIA, following detailed specialist studies.**
GN R. 985 Item 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.* *(a) In the North West Province* *i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;* *ii. Within critical biodiversity areas identified in bioregional plans;* *iv. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open*	**More than 300 square metres of vegetation would need to be cleared for the proposed solar PV energy facility and associated infrastructure. The nature of vegetation on site will be clarified following detailed fieldwork. The proximity of the proposed project to protected areas will be determined at a later stage of the EIA, following detailed specialist studies.**

	space, conservation or had an equivalent zoning.	
GN R. 985 Item 14	*The development of-* *(x) buildings exceeding 10 square metres in size;* *(xii) infrastructure or structures with a physical footprint of 10 square metres or more;* *where such development occurs-* *(a) within a watercourse;* *(b) in front of a development setback; or* *(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse* *(e) In the North West Province* i *Outside urban areas, in:* *(bb) National Protected Area Expansion Strategy Focus areas;* *(dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;* *(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;* *(hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve;*	**The operations and maintenance buildings will be approximately 225m^2, and the solar PV array is likely to be approximately 350ha. The proximity of the proposed project to surface water features and protected areas will be determined at a later stage of the EIA, following detailed specialist studies.**
GN R. 985 Item 18	*The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.* *(e) In the North West Province* i *Outside urban areas, in:* *(bb) National Protected Area Expansion Strategy Focus areas;* *(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter*	**It is likely that existing access roads will need to be upgraded in order to access the site. The proximity of the proposed project to protected areas will be determined at a later stage of the EIA, following detailed specialist studies.**

	5 of the Act and as adopted by the competent authority; *(ee) Critical biodiversity areas (Terrestrial Type 1 and 2) as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;* *(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; or*	

3.1.3 Environmental Impact Assessment Guideline for Renewable Energy Projects, DEA Notice 989 of 2015

The purpose of this document is primarily to provide guidance on the environmental management legal framework applicable to renewable energy operations and all the role players in the sector. The guideline is principally intended for use by the following stakeholder groups:

- Public Sector Authorities (as regulator and/or competent authority);
- Joint public sector authorities and project funders, e.g., Eskom, IDC, etc.
- Private Sector Entities (as project funder/developer/consultant);
- Other interested and affected parties (as determined by the project location and/or scope).

This guideline seeks to identify activities requiring authorisation prior to commencement of that activity, and provide an interface between national EIA regulations and other legislative requirements of various authorities.

The guidelines are applicable for the construction, installation and/or development of the following renewable energy projects:

- Concentrating Solar Power Plant;
- Wind Farm;
- Hydropower Station; and
- Photovoltaic Power Plant.

As the proposed development is for a photovoltaic energy facility it is subject to the recommendations proposed in the guidelines.

3.1.4 National Energy Act No. 34 of 2008

The National Energy Act (Act no, 34 of 2008), promulgated in 2008, has, as one of its key objectives, the promotion of diversity of supply of energy and its sources. From this standpoint, the Act directly references the importance of the renewable energy (RE) sector, with a mention of the solar energy

sector included. The aim is to ensure that the South African economy is able to grow and develop, fast tracking poverty alleviation, through the availability of a sustainable, diverse energy mix. Moreover, the goal is to provide for the increased generation and consumption of RE (Republic of South Africa, 2008).

3.1.5 National Heritage Resources Act No. 25 of 1999

This Act requires all developers to undertake archaeological impact studies whenever any type of development activity is undertaken. Preliminary archaeological impact studies will consequently become a common procedure for all development activities, even if such development may be exempted in terms of the National Environmental Management Act (Act No 107 of 1998).

The law ensures community participation in the protection of national heritage resources and will involve all three levels of government in the management of the country's national heritage. The South African Heritage Resources Agency (SAHRA) will establish and maintain a national policy, strategy plans and standards for heritage resources management and will monitor the system as a whole.

Heritage authorities will assist and co-operate with individuals and organisations concerned with the study, the conservation, promotion and utilisation of national heritage resources. A newly established National Heritage Resources Fund will provide financial assistance for heritage projects.

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

3.1.6 National Water Act No. 36 of 1998, as amended

The National Water Act (NWA) No 36 of 1998 was promulgated on the 20th August 1998. This Act is important in that it provides a framework to protect water resources against over exploitation and to ensure that there is water for socio-economic and economic development, human needs and to meet the needs of the aquatic environment. The Act also recognises that water belongs to the whole nation for the benefit of all people.

It is important to note that water resources are protected under the Act. Under the act, water resources as defined include a watercourse, surface water, estuary or aquifer. A watercourse is defined as a river or spring, a natural channel in which water flows regularly or intermittently, or a wetland, lake or dam into which, or from which water flows.

One of the main aims of the Act is the protection of water resources. 'Protection' in relation to a water resource entails:

- Maintenance of the quality of the water resource to the extent that the water use may be used in a sustainable way;

- Prevention of degradation of the water resource; and
- The rehabilitation of the water resource.

In the context of the proposed development and any potential impact on water resources, the definition of pollution and pollution prevention contained within the Act is relevant. 'Pollution', as described by the Act is the direct or indirect alteration of the physical, chemical or biological properties of a water resource, so as to make it (*inter alia*):

- less fit for any beneficial purpose for which it may reasonably be expected to be used; or
- harmful or potentially harmful to the welfare or human beings, to any aquatic or non-aquatic organisms, or to the resource quality.

This definition of pollution is quite wide ranging, and it applies to all types of water resource. Activities which cause alteration of the biological properties of a watercourse (i.e. the fauna and flora contained within that watercourse are also considered pollution).

In terms of section 19 of the Act owners / managers / people occupying land on which any activity or process undertaken which causes, or is likely to cause pollution of a water resource must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring. These measures may include (inter alia):

- measures to cease, modify, or control any act or process causing the pollution;
- comply with any prescribed waste standard or management practice;
- contain or prevent the movement of pollutants;
- remedy the effects of the pollution; and
- remedy the effects of any disturbance to the bed and banks of a watercourse.

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

3.1.7 National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004 as amended)

The overarching aim of the National Environmental Management: Biodiversity Act (NEMBA) No. 10 of 2004, within the framework of NEMA, is to provide for:

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

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

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

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

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

3.1.8 National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003 as amended)

The overarching aim of the National Environmental Management: Protected Areas Act (NEMPAA) No. 57 of 2003, within the framework of NEMA, is to provide for:

- provide for the declaration and management of protected areas;
- provide for co-operative governance in the declaration and management of protected areas;
- effect a national system of protected areas in South Africa as part of a strategy to manage and conserve its biodiversity;
- provide for a representative network of protected areas on state land, private land and communal land;
- promote sustainable utilisation of protected areas for the benefit of people, in a manner that would preserve the ecological character of such areas;
- promote participation of local communities in the management of protected areas, where appropriate; and
- provide for the continued existence of South African National Parks.

3.1.9 National Forests Act, 1998 (Act No. 84 of 1998)

The National Forest Act (NFA) was enacted to:

- Provide for the protection, management and utilisation of forests;
- The protection of certain plant and animal life;
- The regulation of trade in forest produce;
- The control and management of a national hiking way system and National Botanic Gardens.

The NFA enforces the necessity for a license to be obtained prior to destroying any indigenous tree in a natural forest and, subject to certain exemptions, cutting, disturbing, damaging, destroying or removing any protected tree. The list of protected trees is currently contained in GN 908 of 21 November 2014. Licenses are issued by the Minister and are subject to periods and conditions as may be stipulated.

The NFA is relevant to the proposed project as the removal and/or disturbance and/or clearance of indigenous vegetation may be required and a license in terms of the NFA may be required for this to be done.

3.1.10 Conservation of Agricultural Resources Act No. 43 of 1983

The Conservation of Agricultural Resources Act (CARA) No. 43 of 1983 controls the utilization of natural agricultural resources in South Africa. The Act promotes the conservation of soil, water sources and vegetation as well as the combating weeds and invader plants. The Act has been amended in part by the Abolition of Racially Based Land Measures Act, No. 108 of 1991.

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

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

The CARA is relevant to the proposed projects as the construction of a solar energy facility as well as other components (such as power lines and the substations) may impact on agricultural resources and vegetation on the site. The Act prohibits the spreading of weeds and prescribes control measures that need to be complied with in order to achieve this. As such, measures will need to be taken to protect agricultural resources and prevent weeds and exotic plants from invading the site as a result of the proposed development.

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

3.1.11 Subdivision of Agricultural Land Act No. 70 of 1970, as amended

The Subdivision of Agricultural Land Act No. 70 of 1970 controls the subdivision of all agricultural land in South Africa; prohibiting certain actions pertaining to agricultural land. Under the Act the owner of agricultural land is required to obtain consent from the Minister of Agriculture in order to subdivide agricultural land.

The purpose of the Act is to prevent uneconomic farming units from being created and degradation of prime agricultural land. To achieve this purpose the act also regulates leasing and selling of agricultural land as well as registration of servitudes.

The Act is of relevance to the proposed development as any land within the study area that is zoned for agricultural purposes will be regulated by this Act.

Although the whole of this Act has been repealed by section 1 of the Subdivision of Agricultural Land Act Repeal Act 64 of 1998, this Repeal Act has not been implemented and no date of coming into operation has been proclaimed.

It is important to note that the implementation of this act is problematic as the Act defines 'Agricultural Land' as being any land, except land situated in the area of jurisdiction of a municipality or town council, and subsequent to the promulgation of this Act uninterrupted Municipalities have been established throughout South Africa.

3.1.12 National Road Traffic Act No. 93 of 1996, as amended

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

All the requirements stipulated in the NRTA will need to be complied with during the construction and operational phases of the proposed solar PV energy facility.

3.1.13 Civil Aviation Act No. 13 of 2009

The Civil Aviation Act No. 13 of 2009 controls and regulates aviation within South Africa. It provides for the establishment of a South African Civil Aviation Authority and independent Aviation Safety Investigation Board in compliance with Annexure 13 of the Chicago Convention. It gives effect to various conventions related to aircraft offences, civil aviation safety and security, and provides for additional

measures directed at more effective control of the safety and security of aircrafts, airports and matters connected thereto.

Although the Act is not directly relevant to the proposed development, it should be considered as the establishment of a photovoltaic energy facility may impact on aviation and air traffic safety if located directly within aircraft flight paths.

ATNS (Air Traffic and Navigation Services Company Limited) and the Civil Aviation Authority will be consulted and the required approvals will be obtained.

3.1.14 Additional Relevant Legislation

- Occupational Health and Safety Act No. 85 of 1993
- National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)
- National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008 as amended)
- Development Facilitation (Act No. 67 of 1995)
- The Hazardous Substances Act (Act No. 15 of 1973)
- Water Services Act (Act No. 108 of 1998)
- Electricity Regulation Act (Act No. 4 of 2006 as amended)
- Municipal Systems Act (Act No. 32 of 2000)
- Mineral and Petroleum Resource Development Act (Act No. 28 of 2002 as amended)
- North West Entrepreneurial Development and Sustainable Resources Utilization Act, 2003, as amended
- North West Parks and Tourism Board Act (Act. No. 3 of 1997)

3.2 Key Development Strategies and Guidelines

3.2.1 Integrated Development Plans

An Integrated Development Plan (IDP) is defined in the Local Government: Municipal Systems Act No. 32 of 2000), as an inclusive and strategic plan that:

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

The main purpose of the IDP is considered the enhancement of service delivery and fighting poverty through an integrated and aligned approach between different role-players and stakeholders.

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

The proposed solar PV energy facility falls within the Naledi Local Municipality (LM), which is located within the greater Dr Ruth Segomotsi Mompati District Municipality (DM). The Naledi LM IDP for 2013 – 2014 (2012 – 2017) details the LM's objectives and strategies, among these is the development of an 'Alternative Energy Park'. The IDP states that the electricity system is currently under severe pressure. It is therefore evident that the proposed development is aligned with the goals of the municipal IDP in the study area.

3.2.2 Draft Integrated Energy Plan for the Republic of South Africa, 2013

The Draft Integrated Energy Plan (IEP), developed by the DoE, was undertaken to determine the best way to meet current and future energy service needs in the most efficient and socially beneficial manner, while:

- Maintaining control over economic costs;
- Serving national imperatives such as job creation and poverty alleviation; and
- Minimising the adverse impacts of the energy sector on the environment.

The IEP takes into consideration the crucial role that energy plays in the entire economy and is informed by the output of analyses founded on a solid fact base. It is a multi-faceted, long-term energy framework which has multiple objectives, some of which include:

- To guide the development of energy policies and, where relevant, set the framework for regulations in the energy sector;
- To guide the selection of appropriate technologies to meet energy demand (i.e. the types and sizes of new power plants and refineries to be built and the prices that should be charged for fuels);
- To guide investment in and the development of energy infrastructure in South Africa; and
- To propose alternative energy strategies which are informed by testing the potential impacts of various factors such as proposed policies, introduction of new technologies, and effects of exogenous macro-economic factors.

3.2.3 Integrated Resource Plan, 2010 and updated 2013

The Integrated Resource Plan (IRP) was created in order to plan for projected national electricity demand. Whilst the medium-term power generation mix will continue to lean heavily on the use of fossil fuels, the Revised Balanced Scenario (RBS) of the 2010 Integrated Resource Plan (IRP) includes for a total additional supply capacity of 17.8GWh from renewable sources by 2030. It recommends continuing with the current renewable bid programme with additional annual rounds (of 1000 MW PV capacity; 1000 MW wind capacity and 200 MW CSP capacity), with the potential for hydro at competitive rates.

3.2.4 Department of Energy White Paper on Renewable Energy, 2003

The Department of Energy (DoE) gazetted its White Paper on Renewable Energy in 2003, and introduced it as a "policy that envisages a range of measures to bring about integration of renewable energies into the mainstream energy economy." At that time the national target was fixed at 10 000GWh (0.8Mtoe) renewable energy contribution to final energy consumption by 2013. The White Paper proposed that this would be produced mainly from biomass, wind, solar and small-scale hydropower. It went on to recommend that this renewable energy should to be utilised for power generation and non-electric technologies such as solar water heating and bio-fuels. Since the White Paper was gazetted, South Africa's primary and secondary energy requirements have remained heavily fossil-fuel dependant, both in terms of indigenous coal production and use, as well as the use of imported oil resources. Alongside this, the projected electricity demand of the country has led the National utility Eskom, to embark upon an intensive build programme to secure South Africa's longer-term energy needs, together with an adequate reserve margin.

3.2.5 Independent Power Producer Process

(The following information was extracted from the Eskom website: Guide to Independent Power Producer (IPP) processes in South Africa and Eskom, June 2010
http://www.eskom.co.za/live/content.php?Item_ID=14324)

The objective of this section is to provide an overview of the processes in the country and within Eskom relating to Independent Power Producers (IPPs). It is important that certain enabling policies, rules and regulations are in place to provide certainty and transparency in the introduction of IPPs.

- Country Process

South Africa has two acts that direct the planning and development of the country's electricity sector:

i. The National Energy Act of 2008 (No. 34 of 2008)
ii. The Electricity Regulation Act (ERA) of 2006 (No. 4 of 2006).

In August 2009, the Department of Energy (DoE) gazetted the Electricity Regulations on New Generation Capacity under the ERA. The New Generation Regulations establish rules and guidelines that are applicable to the undertaking of an IPP Bid Programme and the procurement of an IPP for new generation capacity. They also facilitate the fair treatment and non-discrimination between IPPs and the buyer of the energy.

- Formal Programmes

In terms of the New Generation Regulations, the Integrated Resource Plan (IRP) developed by the DoE sets out the new generation capacity requirement per technology, taking energy efficiency and the demand-side management projects into account. This required, new generation capacity must be met through the technologies and projects listed in the IRP and all IPP procurement programmes will be

executed in accordance with the specified capacities and technologies listed in the IRP. The table below highlights the energy plan that has been proposed until 2030.

Table 5: Government Energy Plans up until 2030 in terms of the IRP

New Build Options								
	Coal	**Nuclear**	**Import Hydro**	**Gas - CCGT**	**Peak - OCGT**	**Wind**	**CSP**	**Solar PV**
2010	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	300
2013	0	0	0	0	0	0	0	300
2014	500	0	0	0	0	400	0	300
2015	500	0	0	0	0	400	0	300
2016	0	0	0	0	0	400	100	300
2017	0	0	0	0	0	400	100	300
2018	0	0	0	0	0	400	100	300
2019	250	0	0	237	0	400	100	300
2020	250	0	0	237	0	400	100	300
2021	250	0	0	237	0	400	100	300
2022	250	0	1143	0	805	400	100	300
2023	250	1600	1183	0	805	400	100	300
2024	250	1600	283	0	0	800	100	300
2025	250	1600	0	0	805	1600	100	1000
2026	1000	1600	0	0	0	400	0	500
2027	250	0	0	0	0	1600	0	500
2028	1000	1600	0	474	690	0	0	500
2029	250	1600	0	237	805	0	0	1000
2030	1000	0	0	948	0	0	0	1000
	6250	**9600**	**2609**	**2370**	**3910**	**8400**	**1000**	**8400**

A decision that additional capacity be provided by an IPP must be made with the concurrence of the Minister of Finance. Once such a decision is made, a procurement process needs to be embarked upon to procure that capacity in a fair, equitable and transparent process.

The New Generation Regulations set out the procurement process. The stages within a bid programme are prescribed as follows:

i. Request for Qualifications (RFQ)
ii. Request for Proposals (RFP)
iii. Negotiation with the preferred bidder(s).

A successful bidder will be awarded a Power Purchase Agreement (PPA) subject to approval by the Regulator.

3.2.6 Renewable Energy Strategy for the North West Province

The Renewable Energy Strategy for the North West Province (RES NWP) was released by the Department of Economic Development, Environment, Conservation and Tourism (DEDECT) in December 2012. It was developed in in response to the need of the North West Provinces to participate meaningfully within the renewable energy sector of South Africa. The renewable energy strategy aims to improve the North West Province's environment, reduce the North West Province's contribution to climate change, and alleviate energy poverty, whilst promoting economic development and job creation in the province whilst developing its green economy. This strategy attempts to focus the efforts of all stakeholders and provides a foundation to make the North West Province a primary contributor towards the renewable energy sector within South Africa. The RES NWP states that the North West province has a very good solar potential with an average daily solar radiation greater than 8,000 MJ/m^2 .

3.2.7 North West Provincial Growth and Development Strategy, 2004 to 2014

The North West Provincial Growth and Development Strategy provides a framework for integrated and sustainable growth and economic development for the province and its people over the next ten years. It addresses the formulation of a common vision, goals and objectives of what should be achieved and how the provincial government and its social partners should achieve its objectives. The Strategy establishes the foundation blocks from where the Provincial Programme of Action is negotiated in partnership with a variety of stakeholders in the province. It forms the benchmark from which progress and achievements are monitored and evaluated. The strategy identifies several growth and economic development pillars, ones of which is Mining and Energy.

3.2.8 North West Provincial Development Plan, 2013

The North West Provincial Development Plan (PDP) is predominantly based on the National Development Plan (NDP) in an attempt to align with the objectives and priorities it identifies as well as with the vision for 2030 of a united South-Africa. n the North West province eight of the priorities identified in the National Development Plan (NDP) were identified as key focus areas for the North West Provincial Development Plan (PDP). The selected focus areas represent the main challenge areas hampering growth in the province. The chosen development priorities with which the North West intends to align to the National Development Plan (NDP) include the following:

1. Economy and employment
2. Economic infrastructure

The PDP encourages diversification of the economic base, including in industries such as renewable energy. Expanding renewable energy, with special reference to solar power, is one of the stated actions aimed at addressing economic infrastructure. The renewable energy sector is also highlighted as having potential to create jobs in the province.

3.2.9 The Dr. Ruth Segomotsi Mompati DM Integrated Development Plan (2015/16)

The Dr. Ruth Segomotsi Mompati DM Integrated Development Plan (IDP) (2015/16) states the DM's mission as "To ensure optimal utilisation of available resources through effective, efficient, sustainable, integrated planning and corporate governance". The DM's development plan is aimed at reducing poverty and inequality. The DM's IDP furthermore, states that government should shift investment towards projects and programmes that will assist individuals in improving their lives as well as the lives of their children and the communities they live in. The IDP identifies education and public transport as examples of opportunities that should be explored. Some of the key factors identified inter alia as drivers of the creation of equality and prosperity is job creation, bulk infrastructure expansion, and making the transition to a low carbon economy (Dr. Ruth Segomotsi Mompati DM, 2015/16).

To achieve the recognition of Vryburg as a primary regional node, as a part of the DM's spatial vision, the following IDP projects are proposed:

- Infrastructure provision and upgrades,
- By-pass road,
- CBD upgrades,
- Township regeneration projects in previously disadvantaged areas,
- Local economic development strategies.

3.2.10 The Naledi LM' Integrated Development Plan (2012 – 2017)

In the Naledi LM' Integrated Development Plan (2012 – 2017) it is reiterated that the LM, and Vryburg in particular, has been identified as a priority two investment area due to the LM's regional growth needs, being the main trading centre in the DM, and the district's administrative centre. Some of the opportunities identified with the LM, with reference to the primary study area, include capitalisation on Vryburg's status as secondary regional centre, and a beef beneficiation programme, with Vryburg envisioned as the institutional headquarters of the beneficiation programme (Naledi Local Municipality, 2013).

Threats or weaknesses applicable to the Vryburg region are also identified in the IDP and relevant problems include, the overcrowding and degradation of agricultural land in settlement areas, and a lack of development capital to provide and maintain bulk infrastructure in the LM. Moreover, the plan states that the LM is characterised by old and dilapidated electricity infrastructure, and that additional provision and strengthening of the network is required to meet the rising demand for electricity (Naledi Local Municipality, 2013).

The municipality is in need of additional generation capacity, and a solar farm has previously been approved for the LM (Broedersput area). From a national and provincial policy perspective, the proposed project is supported. Although no clear contravention of local policy was identified, it may

even be argued that the project will advance the position of Vryburg as secondary regional centre and primary regional node, it should not interfere with other key development strategies, such as the beef beneficiation strategy planned for Vryburg.

4 PROJECT NEED AND DESIRABILITY

4.1 National Renewable Energy Requirement

In 2010 South Africa (SA) had 44,157MW of power generation capacity installed. Current forecasts indicate that by 2025, the expected growth in demand will require the current installed power generation capacity to be almost doubled to approximately 74,000MW (SAWEA: 2010).

This growing demand, fuelled by increasing economic growth and social development within Southern Africa, is placing increasing pressure on South Africa's existing power generation capacity. Coupled with this, is the growing awareness of environmental impact, climate change and the need for sustainable development. Despite the worldwide concern regarding GHG emissions and climate change, South Africa continues to rely heavily on coal as its primary source of energy, while most of the countries renewable energy resources remain largely untapped (DME, 2003). There is therefore an increasing need to establish a new source of generating power in SA within the next decade.

The use of renewable energy technologies, as one of a mix of technologies needed to meet future energy consumption requirements is being investigated as part of Eskom's long-term strategic planning and research process. It must be remembered that solar energy is plentiful, renewable, widely distributed, clean and reduces greenhouse gas emissions when it displaces fossil-fuel derived from electricity. In this light, renewable solar energy can be seen as desirable.

4.2 National Renewable Energy Commitment

In support of the need to find solutions for the current electricity shortages, the increasing demand for energy, as well as the need to find more sustainable and environmentally friendly energy resources, South Africa has embarked on an infrastructure growth programme supported by various government initiatives. These include; the National Development Plan (NDP), the Presidential Infrastructure Coordinating Commission (PICC), the Department of Energy's Integrated Resource Plan, the National Strategy for Sustainable Development, the National Climate Change Response White Paper, the Presidency of the Republic of South Africa's Medium-Term Framework, and the National Treasury's Carbon Tax Policy Paper.

The Government's commitment to growing the renewable energy industry in South Africa is also supported by the *White Paper on Renewable Energy* (2003) which sets out the Government's principals, goals and objectives for promoting and implementing renewable energy in South Africa. In order to

achieve the long term goal of achieving a sustainable renewable energy industry, the Department of Energy has set a target of contributing 17,8*GW* of renewable energy to the final energy consumption by 2030. This target is to be produced mainly through, wind and solar; but also through biomass and small scale hydro (DME, 2003; IRP, 2010).

4.3 Solar PV Power Potential in South Africa and Internationally

Internationally, PV is the fastest-growing power generation technology, South Africa has some of the highest levels of solar radiation in the world and as much as 8GW PV could potentially be installed by 2020 (DEA Guideline for Renewable Energy, 2013). Between 2000 and 2009 the installed capacity globally grew on average by 60% per year. Worldwide more than 35GW of PVs are installed and operating, and in South Africa as much as 8GW PV could potentially be installed by 2020.

4.4 Site Specific Suitability

According to the solar map (Figure 5) the North West Province of South Africa has a solar energy concentration of between 8001 and 9000 MJ/m^2. The North West is the province in South Africa with the second highest solar potential. The project site falls within the range of 8501 – 9000 MJ/m^2 and is thus suitable for the establishment of solar PV energy facility. Based on an estimation of the solar energy resource as well as weather, dust, dirt, and surface albedo, pre-feasibility studies conducted by BioTherm have identified the site as optimal for the proposed Sendawo solar PV project.

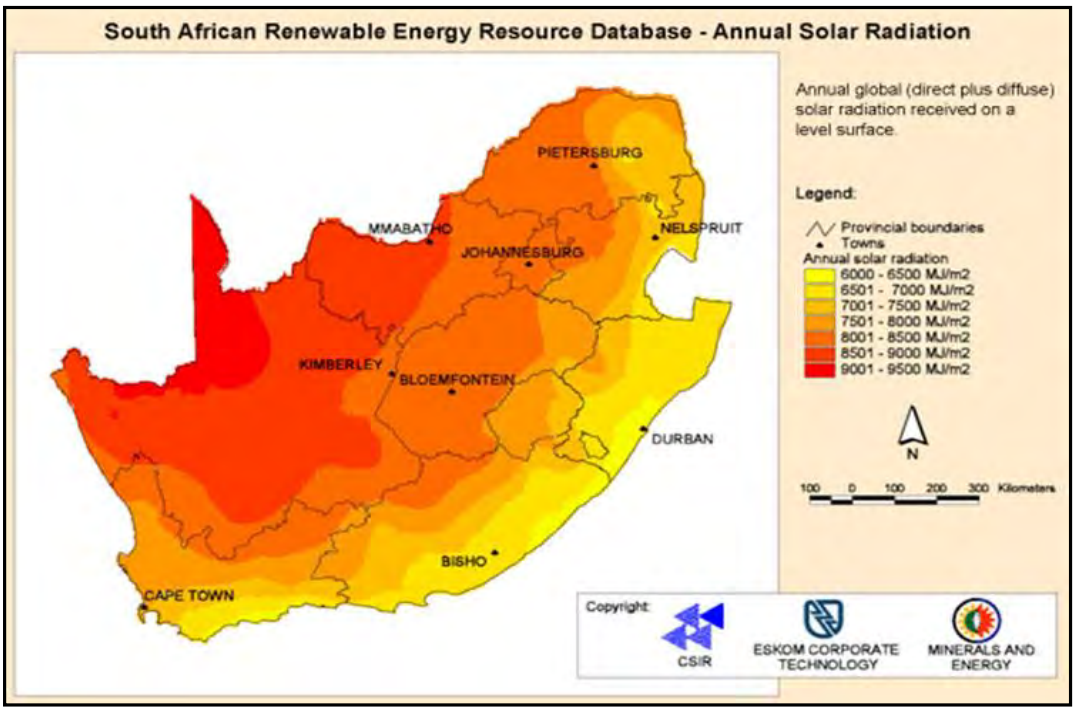

Figure 5**:** National Solar Resource Map (Source: Solar Vision, 2010)

The proposed solar PV energy facility is situated on the farm Portion 1 of the Farm Edinburgh No 735. Portion 1 of the Farm Edinburgh No 735 is used for cattle and game breeding. There is a homestead on the land, occupation numbers vary, and no relocation is envisaged. 200 ha of the farm will be used for the proposed project, it is not envisioned to impact current economic activities. The land owner is in favour of the project. The proposed development will therefore have very little impact on current land use on the affected farm. The site is therefore considered to be suitable from a land use perspective.

The project site near Vryburg has been identified through pre-feasibility studies based on the solar resource. Grid connection and land availability were also important initial considerations. The project site has a relatively flat topography that is suitable for facilities of this kind. The project site also has advantageous grid connection potential, with the existing Mookodi substation approximately 2.7km away. The project site is easily accessible as the tarred N18 national road lies adjacent to site that connects to the N14 and leads to Vryburg.

4.5 Local Need

The Renewable Energy Policy for the North West Province acknowledges that the province is the country's fourth biggest electricity user, with the bulk of this usage taking place in the mining sector. In addition to the job creation opportunities that could ensue from the creation of an RE industry in the province, the RE Policy recognises the impact that this would have on the Province's contribution towards a green South Africa. More specifically, the North West RE Policy mentions the opportunities for the province in the solar energy sphere, making specific reference of the fact that the Dr. Ruth S. Mompati DM represents one of the best regions in the province for exploration of the possibility of a solar energy industry (Department of Economic Development, Environment, Conservation, and Tourism, 2012).

Concerning the spatial planning policy, policy makers believe that coordinated government interaction is required to address the challenges facing the country's municipalities. It specifically recommends exploring the possibilities of using natural resources to generate economic growth and address poverty, and seeking out new areas of comparative advantage (The Presidency of the Republic of South Africa, 2006); these are all aligned to the exploration and establishment of a solar energy industry in the North West Province. The North West PSDF – EMP highlights the fact that large parts of the province are still underdeveloped, under-resourced, and under-serviced. It follows the NSDP in stating that the province's natural resources must be effectively used to address this and other developmental challenges, such as high illiteracy levels and rapid urbanisation, for example, in a sustainable manner.

The review of applicable socio-economic development policies state the importance of the RE sector and solar electricity in addressing climate change issues, while achieving job growth and economic development. The NDP identifies the expansion and acceleration of a commercial RE sector as a key intervention strategy to ultimately eliminate poverty and reduce inequality (National Planning

Commission, 2011). The North West PDP focusses on the rural economy and the transformation of human settlements. It identifies the RE sector, specifically solar and biomass initiatives as becoming increasingly important in the province, especially since its contribution to the province's consumption will become increasingly important over the next two decades (North West Planning Commission, 2013).

Local socio-economic development is centred on the development of Vryburg as a primary regional node, and directed at taking advantage of the area's status as a priority two investment node. The Dr. Ruth S. Mompati DM's IDP states that the investment should shift towards projects that garner equality and job creation. Key factors identified by the DM as drivers of the growth required to achieve equality and poverty reduction include job creation, bulk infrastructure expansion, and transitioning to a low carbon economy (Dr. Ruth Segomotsi Mompati DM, 2015/16).

In the Naledi LM' Integrated Development Plan, it is reiterated that the LM, and Vryburg in particular, has been identified as a priority two investment area due to the LM's regional growth needs, being the main trading centre in the DM, and the district's administrative centre. Some of the opportunities identified within the LM, with reference to the primary study area, include capitalisation on Vryburg's status as a secondary regional centre, and a beef beneficiation programme, with Vryburg envisioned as the institutional headquarters of the beneficiation programme (Naledi Local Municipality, 2013).

5 DESCRIPTION OF THE RECEIVING ENVIRONMENT

The North West Province is considered to be a suitable region for the establishment of solar PV energy facility. Accordingly, a land portion located near Vryburg has been identified as a potential site. A general description of the study area is outlined in the section below. The receiving environment in relation to each specialists study is also provided.

5.1 Regional Locality

The proposed project is located within the North West Province approximately 9km south of Vryburg. It falls within the Naledi Local Municipality that forms part of the Dr Ruth Segomotsi Mompati District Municipality (**Figure 6**). The proposed solar PV energy facility will be accessed by the N18 which lies adjacent to the site. The centre point co-ordinates for the development site and the substation assessment area as well as the start and end point coordinates for the power line alternatives, are included in **Table 6**.

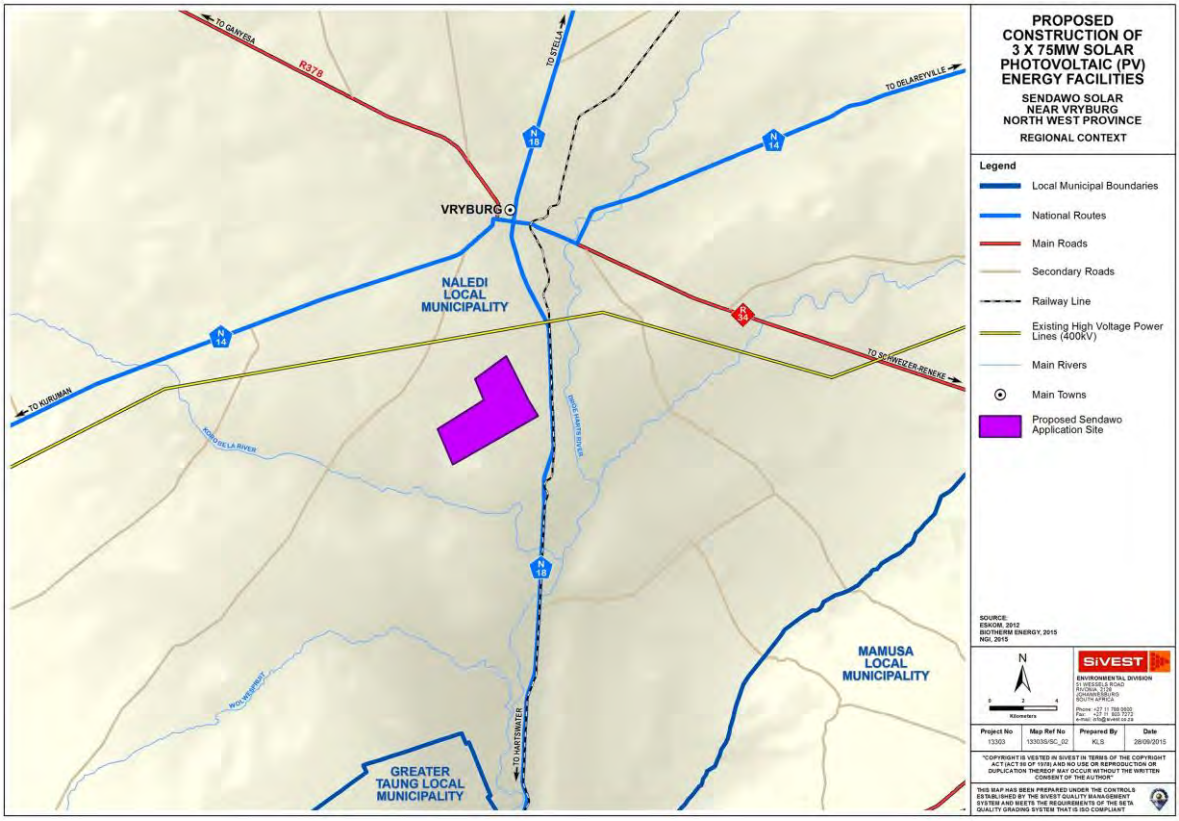

Figure 6: Regional Study Area.

5.2 Study Site Description

The site that is proposed for the Sendawo solar PV energy facility near Vryburg is located on the following farm:

- Portion 1 of the Farm Edinburgh No 735, cadastral number: T0HN00000000073500001

Table 6: Application Site Location

SENDAWO PV APPLICATION SITE				
NORTH-WEST CORNER	**NORTH-EAST CORNER**	**CENTRE POINT**	**SOUTH-WEST CORNER**	**SOUTH-EAST CORNER**
S27° 4' 13.872"	S27° 1' 52.680"	S27° 3' 40.690"	S27° 5' 22.740"	S27° 3' 48.672"
E24° 41' 10.716"	E24° 43' 39.900"	E24° 43' 0.553"	E24° 41' 43.116"	E24° 44' 48.228"

Table 7: PV Array Development Area

DEVELOPMENT AREA			
PHASE	**AREA (HECTARES)**	**CENTRE POINT COORDINATES**	
		SOUTH	**EAST**
SENDAWO SOLAR 1 DEVELOPMENT AREA	367.46	S27° 3' 52.625"	E24° 43' 50.328"

Please note that all maps within the report are included in Appendix 5 and are in A3 format.

The application site as shown on the locality map below comprises Portion 1 of the Farm Edinburgh No 735 which is approximately 1709 hectares, with the proposed Sendawo 1 development area taking up 367 ha (**Figure 7**). However, the 75MW energy facility layout will require approximately 350 ha. The entire application site has been assessed during the scoping phase. Portion 1 of the Farm Edinburgh No 735 is used for cattle and game breeding. There is a homestead on the land, occupation numbers vary, and no relocation is envisaged. The land owner is in favour of the project. The proposed development will therefore have very little impact on current land use on the affected farm.

Preliminary layouts are discussed in Chapter 7 of the DSR and are presented in the EIA plan of study in Chapter 11 of this report. These will be assessed in detail during the EIA phase, and refined to avoid sensitive areas as required.

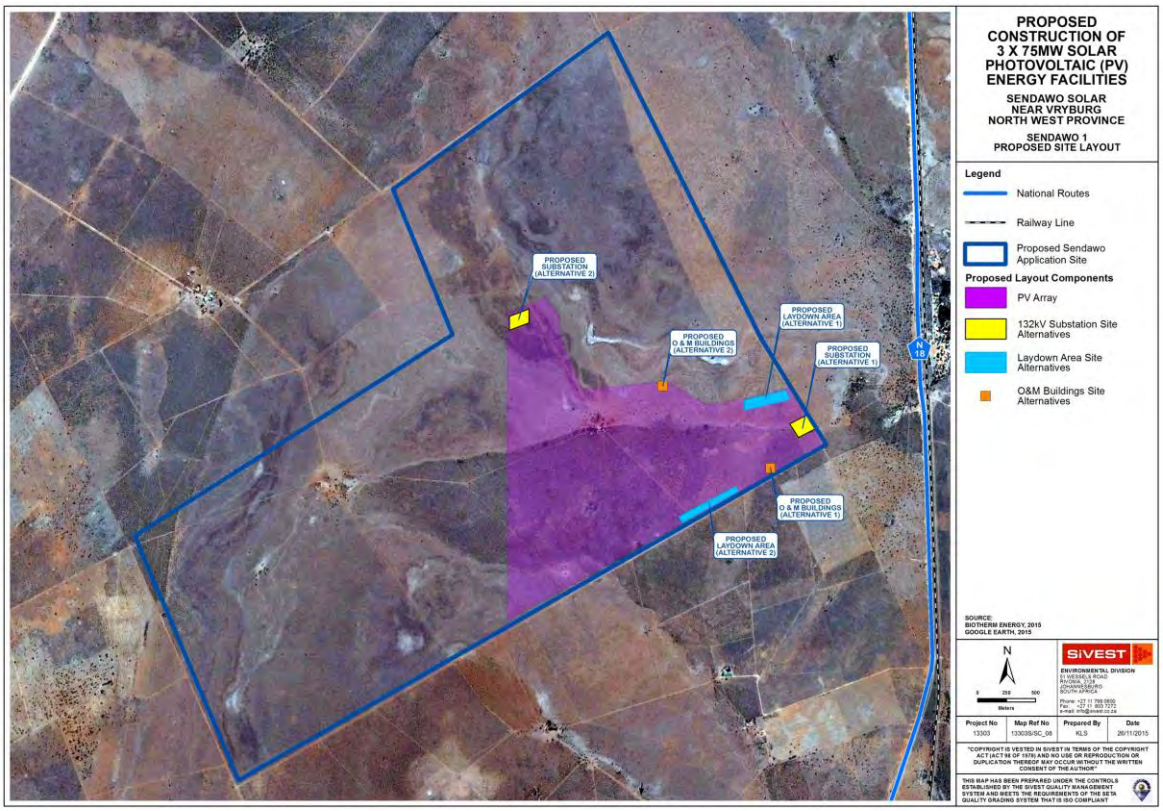

Figure 7: Site locality.

5.3 Topography

The topography of the study site and surrounds is shown below (**Figure 8**). The topography within and in the immediate vicinity of the proposed application site is characterised by a flat to gently undulating landscape sloping down in a south-easterly direction towards the Droe Harts Rivier. The topography in the wider study area is largely characterised by level plains with little noticeable relief and very gradual slopes. The valleys of the Droe Harts and Korobela rivers in the eastern and southern sectors of the study area tend to comprise of more irregular plains and more pronounced slopes. The degree of slope of the site and surrounding area are shown in **Figure 9**.

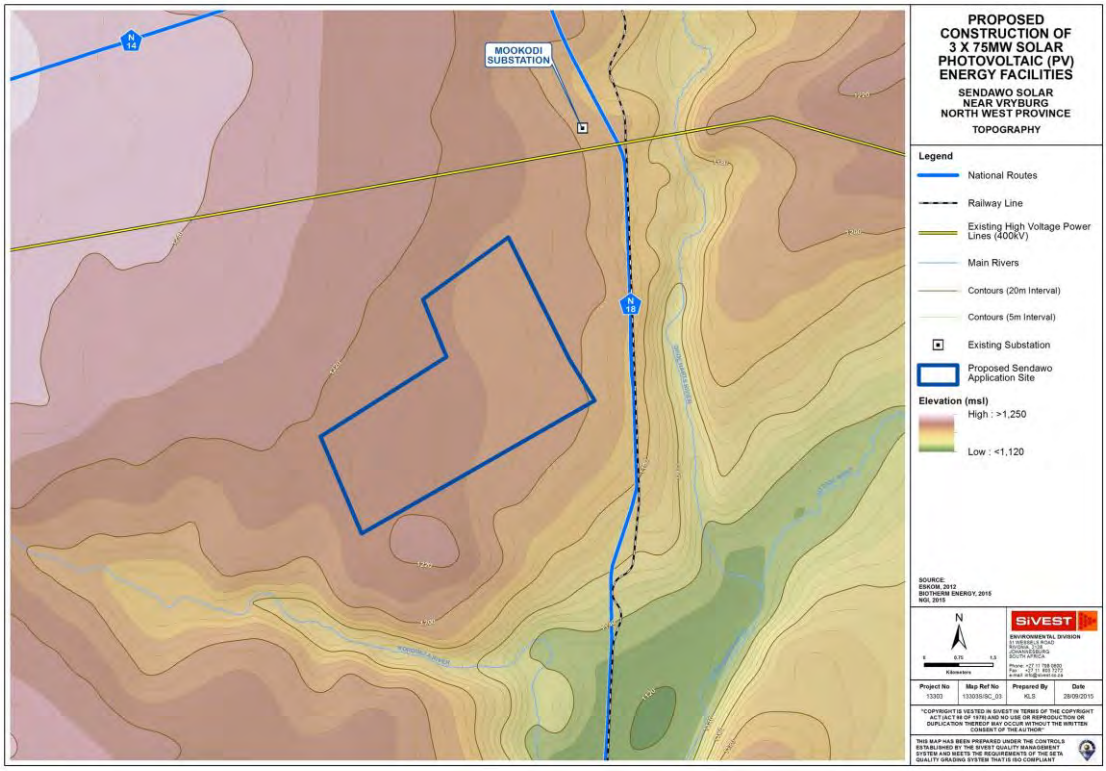

Figure 8: Topography of the study area.

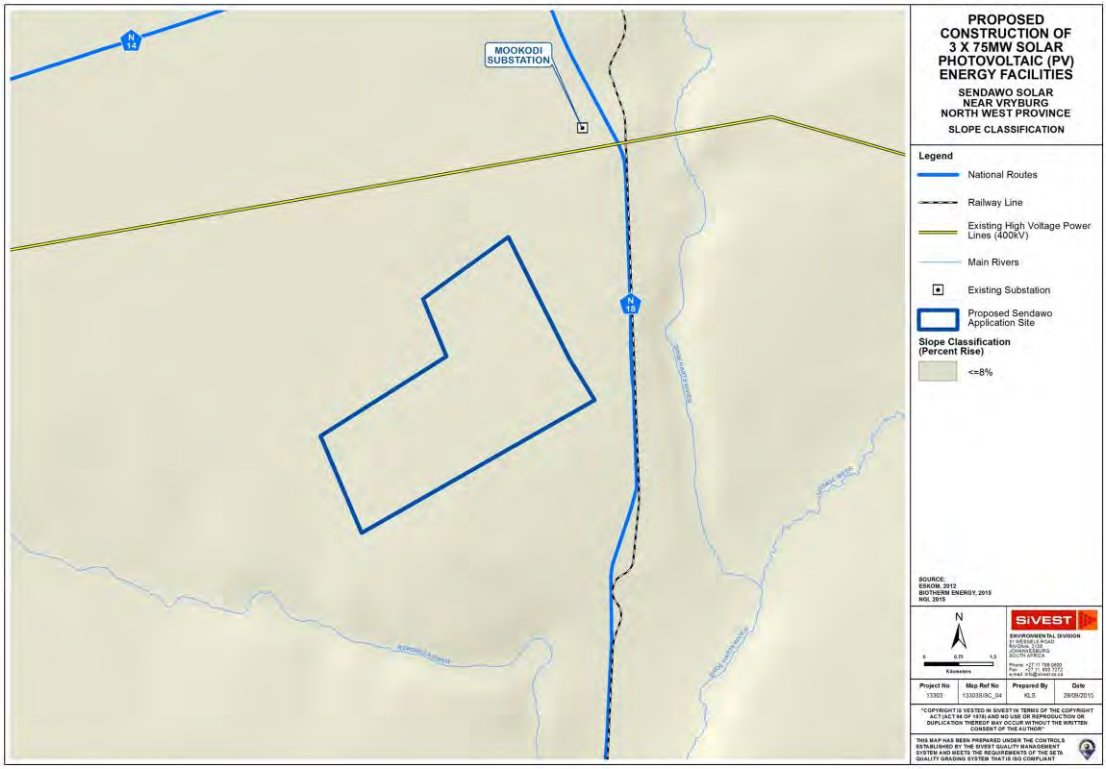

Figure 9: Degree of slope in region of the study area.

5.4 Geology

The geology of the area comprises dolomite of the Schmidtsdrift Formation, with a smaller area of Kalahari sand in the east (Geological Survey, 1984).

The distribution of the geological units in the area is shown in **Figure 10**.

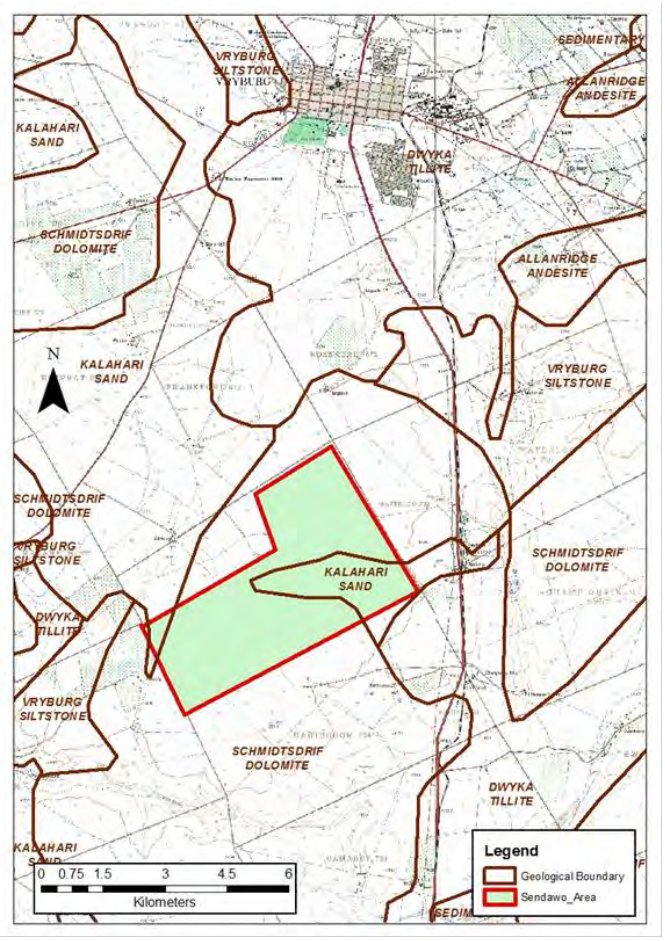

Figure 10: Geological units in the region of the study area

5.5 Land Use

Much of the assessment area is characterised by natural unimproved vegetation, which is used as grazing land for game, cattle, sheep and goats (**Figure 11**). Cultivation is restricted to relatively small areas scattered throughout the study area.

The closest built-up areas are the agricultural town of Vryburg, which is located some 3km north of the visual assessment zone and the Huhudi informal/semi-formal settlement which is located in the northern sector of the study area adjacent to the N18. Within this part of the study area, human influence is also visible in the form of the N18 national route and a railway line which both traverse the study area in a north-south direction as well as electricity transmission infrastructure comprising a 400kV power line and the newly constructed Mookodi Transmission substation. In addition, there are some small quarries in the study area as well as the Arthington Memorial Church and the Tiger Kloof Educational Institution along the N18

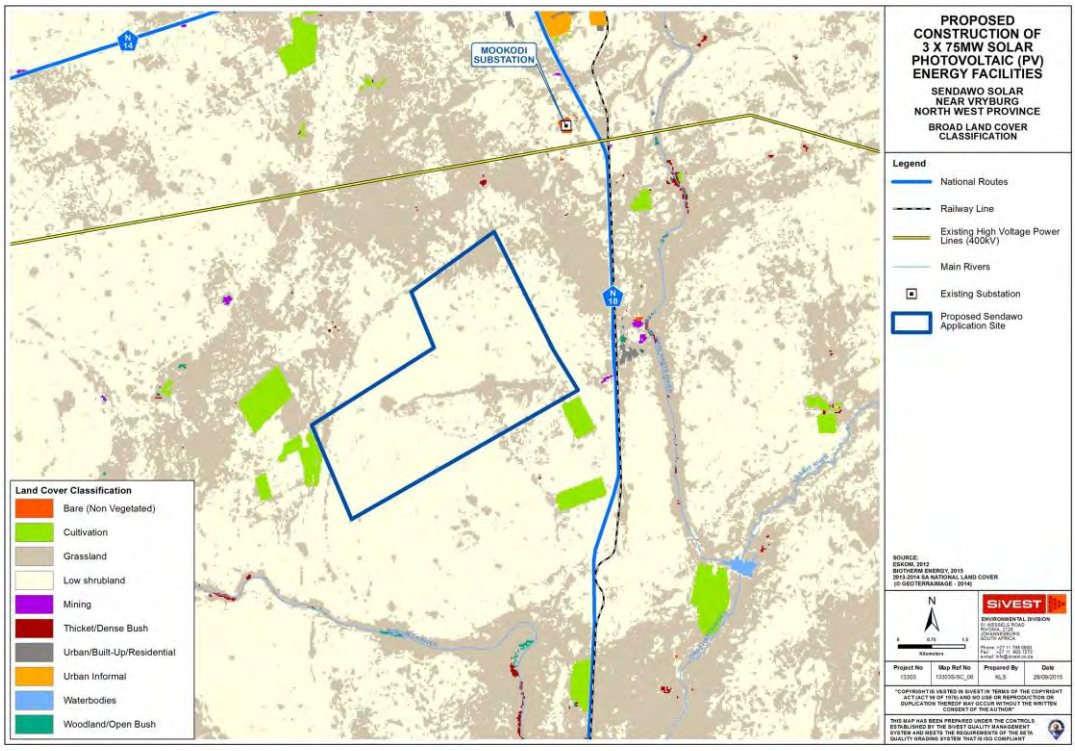

Figure 11: Land use in the region of the study area.

5.6 Climate

The climate of the study area (Kotze & Lonergan, 1984) can be regarded as warm to hot with moderate rain in summer and dry winters. The long-term average annual rainfall in this region of the North West is only 445 mm, of which 357 mm, or 79.5%, falls from November to April. Rainfall is erratic, both locally and seasonally and therefore cannot be completely relied on for agricultural practices. The average evaporation is over 2 600 mm per year, peaking at over 10.5 mm per day in December.

Temperatures vary from an average monthly maximum and minimum of 32.1ºC and 16.7ºC for January to 19.0ºC and -0.6ºC for July respectively. The highest temperature that has been recorded is over 42ºC and the lowest –10.0ºC. Frost occurs most years on 30-40 days on average between early June and mid-September.

5.7 Biodiversity

The Biodiversity Assessment was conducted by David Hoare and is included as Appendix 6A. The environmental baseline from a biodiversity perspective is presented below.

5.7.1 Landuse and landcover of the study area

A landcover map of the study area (Fairbanks et al. 2000) indicates that the study consists of natural vegetation, classified as “thicket and bushland”. The 1:50 000 topocadastral map of the site and a Google image of the site (**Figure 12**) show essentially the same pattern. There is a cluster of farm buildings within the site, otherwise the entire site consists of natural habitat.

Figure 12: Aerial image of the study area.

5.7.2 Broad vegetation types of the region

The sites fall within the Savanna Biome (Rutherford & Westfall 1986, Mucina & Rutherford 2006). The most recent and detailed description of the vegetation of this region is part of a national map (Mucina, Rutherford & Powrie, 2005; Mucina et al. 2006). This map shows one vegetation type occurring within the area of interest, Ghaap Plateau Vaalbosveld. This vegetation type is described in more detail below.

- Ghaap Plateau Vaalbosveld

This vegetation type occurs in the Northern Cape Province and the North West Province on the flat plateau from around Campbell in the south to around Vryburg in the north (Mucina et al. 2006). The vegetation consists of a well-developed shrub layer with *Tarchonanthus camphoratus* and *Acacia karroo* and an open tree layer with *Olea europea* subsp. *africana*, *Acacia tortilis*, *Ziziphus mucronata* and *Rhus lancea*. The vegetation has a relatively low cover of *Acacia* for an arid savannah and is mostly dominated by non-thorny species, such as *Olea europea* subsp. *africana*, *Rhus lancea* and

Tarchonanthus camphoratus. The thorny species, *Acacia tortilis*, *Acacia hebeclada* and *Acacia mellifera* are more important in the northern parts of the vegetation type around Vryburg. This vegetation unit contains a high number of Griqualand West and Kalahari endemics.

Figure 13: Vegetation types of the project study area

5.7.3 Conservation status of broad vegetation types

On the basis of a recently established approach used at national level by SANBI (Driver et al. 2005), vegetation types can be categorised according to their conservation status which is, in turn, assessed according to the degree of transformation relative to the expected extent of each vegetation type. The status of a habitat or vegetation type is based on how much of its original area still remains intact relative to various thresholds. The original extent of a vegetation type is as presented in the most recent national vegetation map (Mucina, Rutherford & Powrie 2005) and is the extent of the vegetation type in the absence of any historical human impact. On a national scale the thresholds are as depicted in **Table 8**, as determined by best available scientific approaches (Driver et al. 2005).

The level at which an ecosystem becomes Critically Endangered differs from one ecosystem to another and varies from 16% to 36% (Driver et al. 2005).

The vegetation type occurring in the study area (**Table 9**) is classified as Least Threatened (Driver et al. 2005; Mucina et al., 2006). None of the vegetation is therefore flagged as being of conservation concern.

Table 8: Determining ecosystem status (from Driver et al. 2005)

*BT = biodiversity target (the minimum conservation requirement).

Habitat remaining (%)			
80–100	least threatened	LT
60–80	vulnerable	VU
*BT–60	endangered	EN
0–*BT	critically endangered	CR

Table 9: Conservation status of different vegetation types occurring in the study area, according to Driver *et al*. 2005 and Mucina *et al*. 2005.

Vegetation Type	Target (%)	Conserved (%)	Transformed (%)	Conservation status	
				Driver *et al*. 2005; Mucina *et al*., 2006	Draft Ecosystem List (NEMBA)
Ghaap Plateau Vaalbosveld	16	0	1	Least Threatened	Not listed

5.7.4 Biodiversity Conservation Plans

The North-West Province Biodiversity Conservation Assessment (obtained from bgis.sanbi.org) provides maps that show Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs), corridors and hills. This shows a variety of features within the study area, including the following:

1. Wetland CBAs: a number of small pans on site considered to be irreplaceable wetlands.
2. Wetland ESAs: buffer areas of terrestrial habitat adjacent to wetlands that are important ecological support areas for the aquatic systems (500 m wide).
3. CBA corridors: Provincial-level biodiversity corridor network aimed at retaining connectivity between geographical areas. A small sliver of the eastern corner of the site falls within this category.
4. ESA dolomites: Areas of dolomite and their associated aquifers, important as groundwater recharge areas. Most of the site falls within this category.

5.7.5 Proposed Protected Areas

According to the National Parks Area Expansion Strategy (NPAES), there is an area 20 km to the north-west of the project study area that has been identified as priority areas for inclusion in future protected

areas. This particular component of the landscape is considered to be of high biodiversity value by National Parks, but the proposed project does not affect this area at all.

5.7.6 Red List plant species of the study area

Lists of plant species of conservation concern previously recorded in the quarter degree grids in which the study area is situated were obtained from the South African National Biodiversity Institute. These are listed in the biodiversity specialist report. Additional species that could occur in similar habitats, as determined from database searches and literature sources, but have not been recorded in these grids are also listed.

There are two species that may occur in the study area, the succulent, *Lithops lesliei* subsp*. lesliei*, listed as Near Threatened, and the herb, *Rennera stellata*, listed as Vulnerable (see **Table 10** for explanation of categories). *Rennera stellata* is found in seasonally waterlogged pans and on unweathered calcrete rocks, in full sun. The species has been recorded in two neighbouring grids in the type of habitat that is found on site and the possibility of it occurring in the study area is therefore considered to be high. *Lithops lesliei* subsp. *lesliei* is found in arid grasslands, usually in rocky places, growing under the protection of forbs and grasses. It is possible that it could also occur on site.

Table 10: Explanation of IUCN Ver. 3.1 categories (IUCN, 2001), and Orange List categories (Victor & Keith, 2004).

IUCN / Orange List category	**Definition**	**Class**
EX	Extinct	Extinct
CR	Critically Endangered	Red List
EN	Endangered	Red List
VU	Vulnerable	Red List
NT	Near Threatened	Orange List
Declining	Declining taxa	Orange List
Rare	Rare	Orange List
Critically Rare	Rare: only one subpopulation	Orange List
Rare-Sparse	Rare: widely distributed but rare	Orange List
DDD	Data Deficient: well-known but not enough information for assessment	Orange List
DDT	Data Deficient: taxonomic problems	Data Deficient
DDX	Data Deficient: unknown species	Data Deficient

5.7.7 Red List animal species of the study area

All Red List vertebrates (mammals, birds, reptiles, amphibians) that could occur in the study area are listed in the biodiversity specialist report.

There are 77 mammal species that have a geographical distribution that includes the study area, of which nine are listed in a conservation category of some level. Of the listed species, there are three of low conservation concern that could occur in available habitats in the study area. These are the Brown Hyaena, the Honey Badger and Southern African Hedgehog. All of these species are classified nationally as near threatened (NT), but globally as Least Concern. They are, therefore, of relatively low conservation concern in comparison to more threatened species found in other parts of the country. The Honey Badger and the Hedgehog are protected under the National Environmental Management: Biodiversity Act and any impacts on a specimen of this species or that may negatively affect the survival of the species would require a permit.

There are a total of 12 frog species with a geographical distribution that includes the study area. The Giant Bullfrog is the only amphibian species with a distribution that includes the study area and which could occur on site. This species is listed as Least Concern globally and Near threatened in South Africa. It is, however, protected under the National Environmental Management: Biodiversity Act and any impacts on a specimen of this species or that may negatively affect the survival of the species would require a permit.

There are a total of 48 reptile species with a geographical distribution that includes the study area. There is one reptile species of conservation concern that has a distribution that includes the study area, the Southern African Python. This species is not listed in a threat category, but is protected under the National Environmental Management: Biodiversity Act.

There are a total of 287 bird species that have a geographical distribution that includes the study area, of which 22 species are listed in a conservation category. Many of these listed bird species could potentially occur on site, because they have wide ranges and forage over wide areas. However, few of these species are likely to breed on site and none of them are likely to be dependent on the site relative to surrounding areas. The Kori Bustard and Secretarybird are the species probably most likely to be found on the site itself, but any of the others could potentially be seen there.

5.7.8 Protected Plants (National Environmental Management: Biodiversity Act)

Plant species protected under the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) are listed in the biodiversity specialist report. One plant species that appears on this list that could potentially occur in the general region, although they have not previously been recorded in the grids of the study area, is *Harpagophytum procumbens.*

Harpagophytum procumbens occurs in Angola, Botswana, Mozambique, Namibia, South Africa, Zambia, and Zimbabwe. Within South Africa this species occurs in the Northern Cape, North West,

Free State, and Limpopo Provinces and the largest populations are found in the communally owned areas of the North West Province and the north eastern parts of the Northern Cape. The species is found in well drained sandy habitats in open savanna and woodlands. It has not been previously recorded in this grid, but has been recorded in the grids to the south and north. It is considered possible, but unlikely that this species could occur on site due to habitat conditions found there relative to the species requirements.

5.7.9 Protected trees

Tree species protected under the National Forest Act are listed in the biodiversity specialist report. The only two that have a geographical distribution that includes the study sites are *Acacia erioloba* and *Boscia albitrunca* (Shepherd's Tree / Witgatboom / !Xhi).

Acacia erioloba (Camelthorn / Kameeldoring) is found in savanna, semi-desert and desert areas with deep, sandy soils and along drainage lines in very arid areas, sometimes in rocky outcrops. This species could potentially occur on site in areas affected by the proposed project.

Boscia albitrunca (Shepherd's Tree / Witgatboom / !Xhi) occurs in semi-desert areas and bushveld, often on termitaria, but is common on sandy to loamy soils and calcrete soils. This species could potentially occur on site in areas affected by the proposed project.

5.7.10 Protected Animals

There are a number of animal species protected according to the National Environmental Management: Biodiversity Act (Act No. 10 of 2004).According to this Act, "*a person may not carry out a restricted activity involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7"*. Such activities include any that are *"of a nature that may negatively impact on the survival of a listed threatened or protected species"*. This implies that any negative impacts on habitats in which populations of protected species occur or are dependent upon would be restricted according to this Act.

Those species protected according to the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) that have a geographical distribution that includes the site are listed in the biodiversity specialist report, marked with the letter "N". This includes the following species: Roan Antelope, Cape Clawless Otter, Brown Hyaena, Spotted-necked Otter, Honey Badger, Leopard, Cape Fox, Southern African Hedgehog, Southern African Python, Giant Bullfrog, Kori Bustard, Blue Crane, Martial Eagle, Lesser Kestrel, Black Stork, Cape Vulture, Lappet-faced Vulture and White-backed Vulture.

Due to habitat and forage requirements and the fact that some species are restricted to game farms and/or conservation areas, only the Brown Hyaena, Black-footed Cat, Honey Badger, Leopard, Cape Fox, Giant Bullfrog and some of the birds (Kori Bustard, Blue Crane, Martial Eagle, Lesser Kestrel and Black Stork) have a likelihood of occurring on site. All of these species are mobile animals that are likely to move away in the event of any activities on site disturbing them. They are therefore unlikely to be affected by the proposed development of the solar power facility and associated infrastructure.

5.7.11 Important Bird Areas

The study area is not within an Important Bird Area (IBA). The nearest IBAs are the Spitskop Dam IBA, which is 100 km away to the south, and the Barberspan & Leeupan IBA, which is 100 km away to the east / north-east.

5.7.12 Habitats on site

Aerial imagery indicates that most of the site consists of natural vegetation (shrubland called Ghaap Plateaux Vaalbosveld). There are various depressions on site that are possibly pans. The distribution of main habitats on site, as identifiable from aerial imagery, is shown in **Figure 14**.

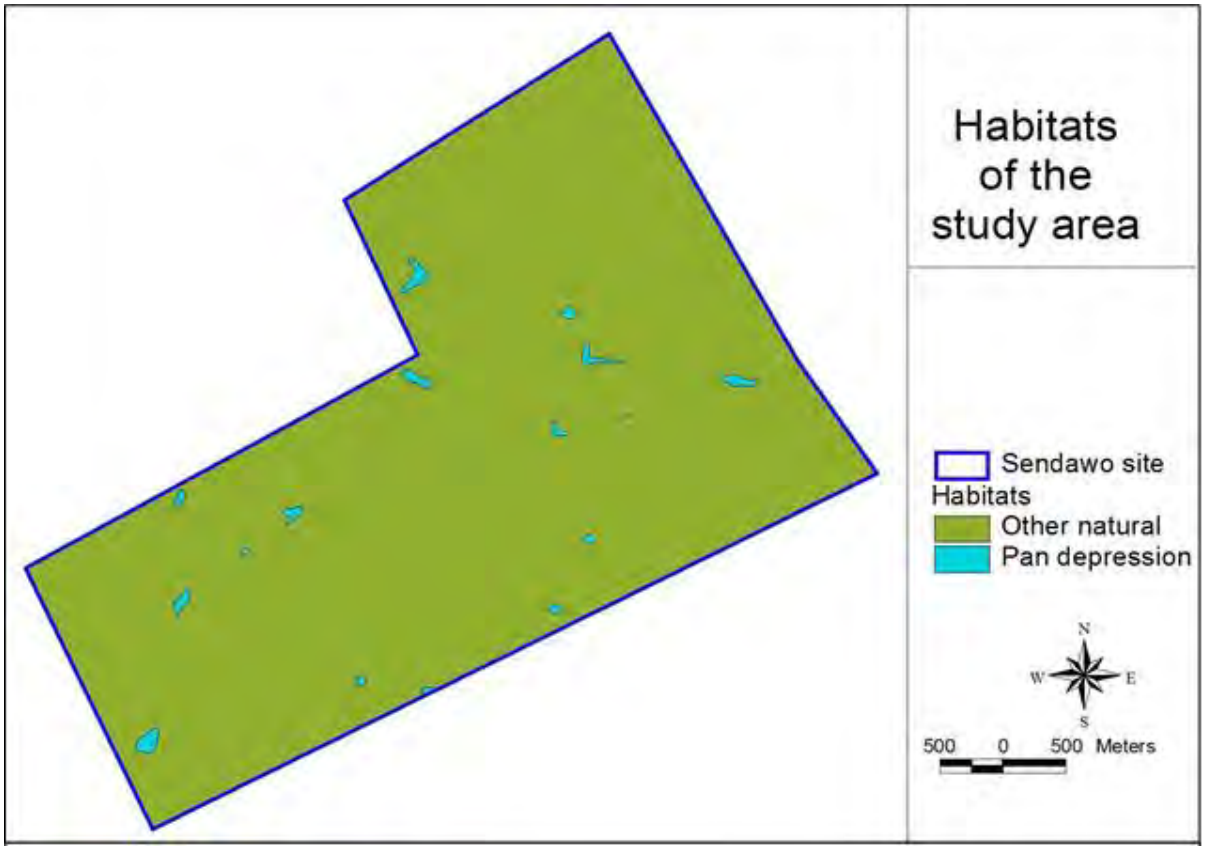

Figure 14: Main habitats of the study area

5.7.13 Watercourses

The study area contains no watercourses / drainage lines that are visible from aerial imagery.

5.7.14 Sensitivity assessment

The sensitivity assessment identifies those parts of the study area that have high conservation value or that may be sensitive to disturbance. Areas of potentially high sensitivity are shown in **Figure 15**. The information provided in the preceding sections was used to compile a map of remaining natural habitats and areas important for maintaining ecological processes in the study area. The only feature of potential concern that needs to be taken into account in order to evaluate sensitivity in the study area is the presence of non-perennial watercourses. These represent ecological processes, including groundwater dynamics, hydrological processes, nutrient cycling and wildlife dispersal;

These factors have been taken into account in evaluating sensitivity within the study area. Watercourses are considered to be the most sensitive features on site. The sensitivity classification is as follows:

- MEDIUM-HIGH: All of the watercourses, pans and drainage areas on site are classified as having medium-high sensitivity (see **Figure 15**). They are protected according to the National Water Act (Act 36 of 1998). Ecologically, they are areas that provide moderate value ecosystem goods and services.
- MEDIUM: The majority of the study area is classified as having medium sensitivity (see **Figure 15**). These are areas of natural vegetation which harbour no particular features of conservation concern, except for habitat that is potentially suitable for five near threatened animal species and one near threatened plant species (none confirmed to occur on site).
- LOW: Transformed areas are classified as having low sensitivity (see **Figure 15**). These are areas in which no intact natural habitat still remains.

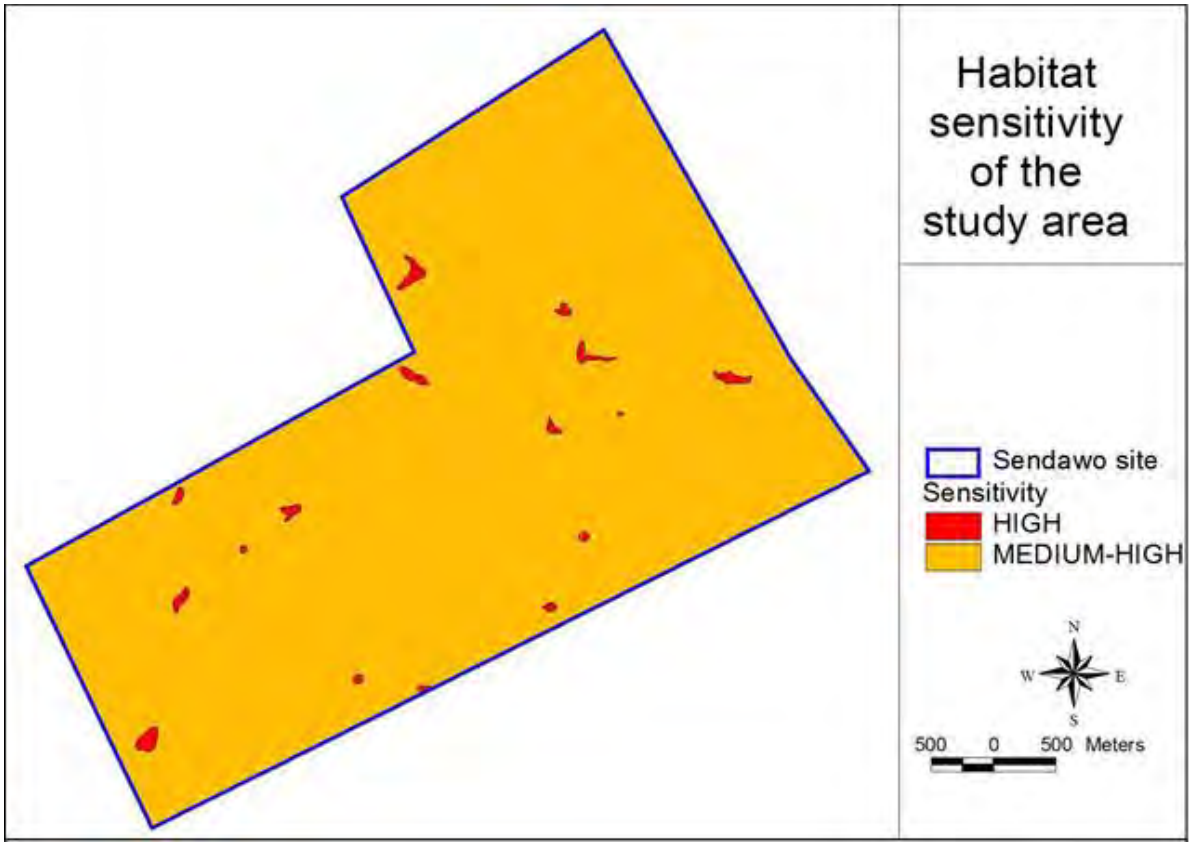

Figure 15: Habitat sensitivity of the study area

5.8 Avifauna

The Avifauna Assessment was conducted by Chris van Rooyen and is included as Appendix 6B. The environmental baseline from an avifaunal perspective is presented below.

5.8.1 Biomes and Vegetation Types

The proposed site is situated in a transitional zone between grassland and savanna approximately 10km south of the town of Vryburg in the North West Province. From satellite imagery and general knowledge of the area it can be ascertained that the habitat in the core study area is highly homogenous and consists of extensive plains with grass and low shrub, with scattered, stunted *Vachellia* trees. 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 (Barnes 1998, Birdlife 2014). The development is too far away from these IBAs to have any direct impact on them.

5.8.2 Habitat classes and avifauna in the study area

Whilst much of the distribution and abundance of the bird species in the study area can be explained by the description of the natural vegetation, it is as important to examine the modifications which have

changed the natural landscape, and which may have an effect on the distribution of avifauna. These are sometimes evident at a much smaller spatial scale than the biome or vegetation types.

The following bird habitat classes have been identified at the core study area and immediate surroundings from satellite imagery and general knowledge of the area, subject to further field investigations:

- *Savanna*

The dominant natural vegetation type is Ghaap Plateau Vaalbosveld. Ghaap Plateau Vaalbosveld consists of a well-developed shrub layer of *Tarchonanthus camphoratus* with very few trees. Rainfall is in summer and autumn ranging from 300mm – 500mm, with temperatures ranging from -7.5°C to 36°C (Mucina & Rutherford 2006). Ghaap Plateau Vaalbosveld is a form of arid woodland. Arid woodland occurs where there is intermediate, though variable rainfall with hot, wet summers and cool, dry winters.

Priority species that could be found in natural savanna vegetation on the development site are Cape Sparrow, European Roller, Scaly-feathered Finch, Yellow Canary, Kalahari Scrub-robin, Red-headed Finch, Black-chested Prinia, Chestnut-vented Tit-babbler, Crimson-breasted Shrike, Cape Penduline-Tit, Bokmakierie, Eastern Clapper Lark, Pririt Batis, Southern Pale Chanting Goshawk, Chat Flycatcher, Lark-like Bunting, Namaqua Sandgrouse, Fiscal Flycatcher, Karoo Thrush, Northern Black Korhaan, Orange River White-eye, White-backed Mousebird, Cape White-eye, Ant-eating Chat. Occasional visitors to the site could include Martial Eagle, Secretarybird, Kori Bustard and Double-banded Courser.

- *Surface Water*

Surface water is of specific importance to avifauna in this arid study area. The core study area contains at least two boreholes with water troughs for livestock. The ephemeral Dry Harts River runs directly east of the core study area and normally only contains water in the rainy season. An ephemeral drainage line, the Karobela Spruit runs directly south of the core study area, but is likely to be dry most of the year, except after exceptional rain events. All of these features would need to be confirmed through site investigations.

The ephemeral rivers, particularly the Dry Harts River which is situated east of the site, is important for a variety of waterbirds, but not specifically for the majority of priority species in this instance. Exceptions are Black Stork and Maccoa Duck, which were recorded sparsely by SABAP2 and could be attracted to pools in the Dry Harts River. South African Shelduck could also be an occasional visitor. Namaqua Sandgrouse, also sparsely recorded by SABAP 2, could also visit pools in the river to drink and possibly a few Burchell's Sandgrouse. Abdim's Stork could potentially forage on irrigated fields along the river channel. Priority raptors and possibly vultures (rarely) could also use pools in the river bed for bathing and drinking.

Boreholes with open water troughs are important sources of surface water and are used extensively by various species, including large raptors, to drink and bath. Apart from priority raptors such as Southern

Pale Chanting Goshawk, smaller priority species such as Sociable Weaver, Cape Sparrow, Red-headed Finch, Scaly-feathered Finch, Yellow Canary, Namaqua Sandgrouse and Lark-like Bunting congregate in large numbers around water troughs which in turn could attract predators such as Southern Pale Chanting Goshawk. The habitat around boreholes often attract other priority species such as Bokmakierie, Kalahari Scrub-robin, Crimson-breasted Shrike, Chestnut-vented Tit-babbler, Fiscal Flycatcher, Karoo Thrush and White-backed Mousebird.

- *High voltage lines*

High voltage lines are an important potential roosting and breeding substrate for large raptors in the study area. Existing high-voltage lines are used extensively by large raptors, especially Martial Eagles, for breeding purposes (Jenkins et al. 2006). 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, was identified from satellite imagery, running in an east – west direction north of the core study area, which will require further investigation from a potential priority raptor breeding perspective. At its closest point, the core study area is approximately 500m from the line.

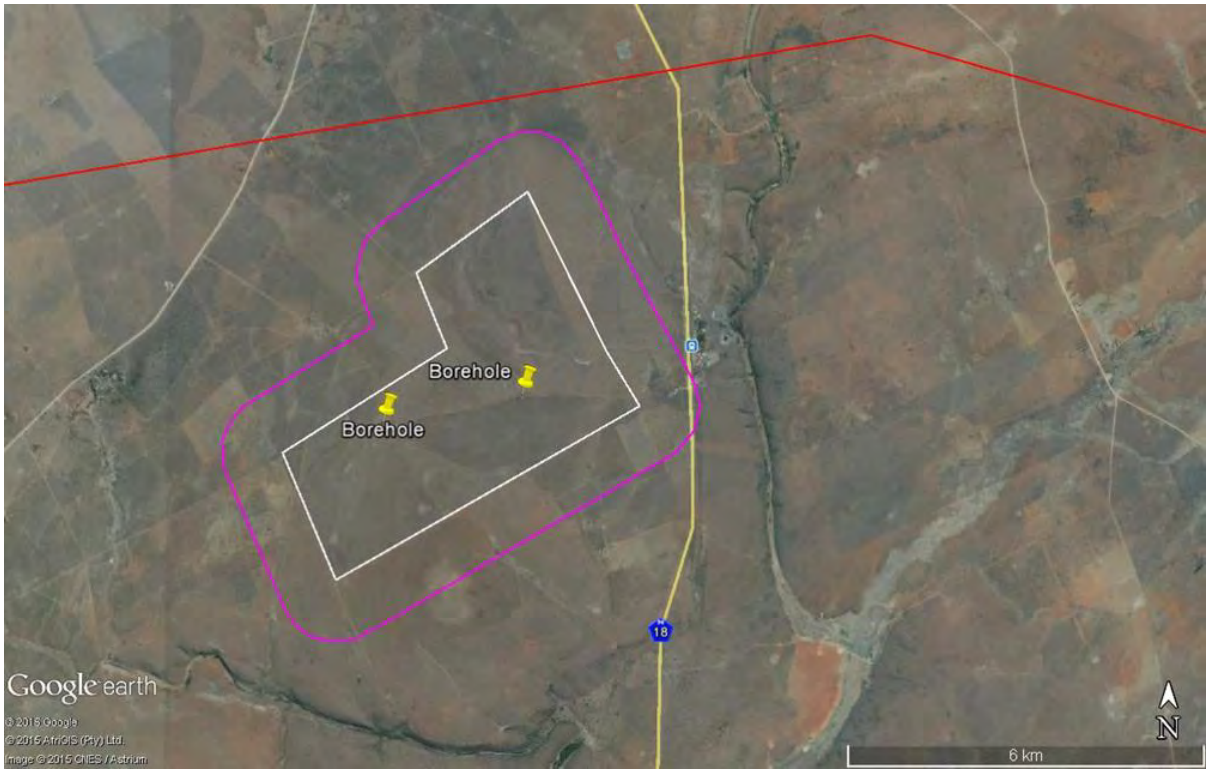

Figure 16: The location of boreholes and Mercury – Ferrum 400kV (red line) relative to the study area (purple polygon). Note also the Dry Harts River and the Karobela Spruit east and south of the study area

- *Avifauna*

An estimated 220 species could potentially occur at the core study area and immediate surroundings (including the Dry Harts River). Of these, 9 are South African Red Data species, 11 are southern African endemics and 22 are near-endemics. This means that 4% of the species that could potentially occur at the core study area and immediate surroundings are Red Data species, and 15% are southern African endemics of near-endemics. Southern Africa contains 13 avifaunal endemic regions, namely Western Arid, Woodland, Evergreen Forest, Grassland, Montane, Rocky slopes and cliffs, Fynbos, Marine and Inland Waters (MacLean 1999). Of these regions, Grassland, where the study area is located, contains the fourth highest number of endemics. Overall, the core study area and immediate surroundings potentially contains a total of 33 endemics and near-endemics, which is 20% of the 167 southern African endemics and near-endemics (Hockey et al. 2005).

See the avifaunal specialist report for a list of species potentially occurring in the core study area and immediate surroundings. Potential impacts on priority species are listed in **Table 11**.

Table 11: Priority species potentially occurring in the study area

EN = Endangered
VU = Vulnerable
NT = Near-threatened
LC = Least concern
End = Southern African Endemic
N-End = Southern African near endemic

Name	Scientific name	National Red Data Status	Global status	Collisions with PV panels	Displacement through disturbance	Displacement through habitat transformation*
Ant-eating Chat	*Myrmecocichla formicivora*	End	LC	x	x	x
Ashy Tit	*Parus cinerascens*	N-end	LC	x	x	x
Black-chested Prinia	*Prinia flavicans*	N-end	LC	x	x	x
Bokmakierie	*Telophorus zeylonus*	N-end	LC	x	x	x
Cape Penduline – Tit	*Anthoscopus minutus*	N-end	LC	x	x	x
Cape Sparrow	*Passer melanurus*	N-end	LC	x	x	x
Chat Flycatcher	*Bradornis infuscatus*	N-end	LC	x	x	x
Chestnut-vented Tit-babbler	*Parisoma subcaeruleum*	N-end	LC	x	x	x
Double-banded Courser	*Rhinoptilus africanus*	NT	LC	x	x	x
Eastern Clapper-Lark	*Mirafra fasciolata*	N-end	LC	x	x	x
European Roller	*Coracias garrulus*	NT	NT	x	x	x
Fairy Flycatcher	*Stenostira scita*	End	LC	x	x	x
Grey-backed Sparrowlark	*Eremopterix verticalis*	N-end	LC	x	x	x
Kalahari-Scrub-Robin	*Cercotrichas paena*	N-end	LC	x	x	x

Name	Scientific name	National Red Data Status	Global status	Collisions with PV panels	Displacement through disturbance	Displacement through habitat transformation*
Kori Bustard	*Ardeotis kori*	NT	NT	-	x	x
Lark-like Bunting	*Emberiza impetuani*	N-end	LC	x	x	x
Martial Eagle	*Polemaetus bellicosus*	EN	VU	-	x	x
Namaqua Sandgrouse	*Pterocles namaqua*	N-end	LC	x	x	x
Northern Black Korhaan	*Afrotis afraoides*	End	LC	x	x	x
Orange River White-eye	*Zosterops pallidus*	End	LC	x	x	x
Pririt Batis	*Batis pririt*	N-end	LC	x	x	x
Red-headed Finch	*Amadina erythrocephala*	N-end	LC	x	x	x
Sabota Lark	*Calendulauda sabota*	N-end	LC	x	x	x
Scaly-feathered Finch	*Sporopipes squamifrons*	N-end	LC	x	x	x
Secretarybird	*Sagittarius serpentarius*	VU	VU	-	x	x
Sociable Weaver	*Philetairus socius*	End	LC	x	x	x
South African Shelduck	*Tadorna cana*	End	LC	x	x	x
Southern Pale Chanting Goshawk	*Melierax canorus*	N-end	LC	x	x	x
Spike-heeled Lark	*Chersomanes albofasciata*	N-end	LC	x	x	x
Yellow Canary	*Crithagra flaviventris*	N-end	LC	x	x	x
Black Stork	*Ciconia nigra*	VU	LC	x	-	-
Burchell's Sandgrouse	*Pterocles burchelli*	N-end	LC	x	-	-
Barred Wren-Warbler	*Calamonastes fasciolatus*	N-end	LC	x	x	x
Burchell's Courser	*Cursorius rufus*	VU, N-end	LC	x	x	x
Maccoa Duck	*Oxyura maccoa*	NT	NT	x	-	-

Name	Scientific name	National Red Data Status	Global status	Collisions with PV panels	Displacement through disturbance	Displacement through habitat transformation*
Abdim's Stork	*Ciconia abdimii*	NT	LC	x	-	-
Crimson-breasted Shrike	*Laniarius atrococcineus*	N-end	LC	x	x	x
Spike-heeled Lark	*Chersomanes albofasciata*	N-end	LC	x	x	x
Southern Pied Babbler	*Turdoides bicolor*	End	LC	x	x	x
Fiscal Flycatcher	*Sigelus silens*	End	LC	x	x	x
White-backed Mousebird	*Colius colius*	End	LC	x	x	x
Karoo Thrush	*Turdus smithi*	End	LC	x	x	x
Cape White-eye	*Zosterops virens*	End	LC	x	x	x

With smaller species this impact might result in partial but not total exclusion from the site, depending on the level of vegetation transformation

5.9 Surface Water

The Surface Water Assessment was conducted by Shaun Taylor and Stephan Jacobs of SiVEST. The full report is included in Appendix 6C. The environmental baseline from a surface water perspective is presented below.

5.9.1 Database Identified Surface Water Resource Occurrence in the Study Area

The following findings from the study are limited to the databases that were directly relevant and where information was available. Not all databases and corresponding information were relevant for this study.

In terms of the **National** and **North West ENPAT (2000)** databases, the study area is found within the Lower Vaal Water Management Area. The study area was further found to be situated within the Vaal Primary Catchment. More specifically, a large part of the study area (approximately ¾) is found within the C32B quaternary catchment. The remainder of the study area (approximately ¼) is found within the C32D quaternary catchment. Both of these quaternary catchments (C32B and C32D) are considered to have moderate ecological sensitivity.

Of the surface water resources identifiable in the databases (**National**, **North West ENPAT** and **NFEPA**), the study area was not found to contain any surface water resources such as rivers and wetlands.

Within close proximity to the study area, the following surface water resources identifiable in the databases (**National** & **North West ENPAT** and **NFEPA**) were noted:

- Two (2) NFEPA identified rivers, namely the Droe Harts and Korobela, located roughly 1900m east and 2100m south of the study area respectively.
- One (1) WETFEPA identified artificial un-channelled valley bottom wetland located roughly 1700m east of the study area;

Over and above the already mentioned, no wetlands or other surface water features were identifiable from other remaining databases consulted that are in close proximity to the proposed Sendawo Solar PV facilities, and are expected to be affected by the proposed PV facilities (**Figure 17**).

In addition, a large part of the study area was deemed to fall within a Category 2 Critical Biodiversity Area (CBA 2). A small portion of the study area was also found to fall within a Category 1 Ecological Support Area (ESA 1).

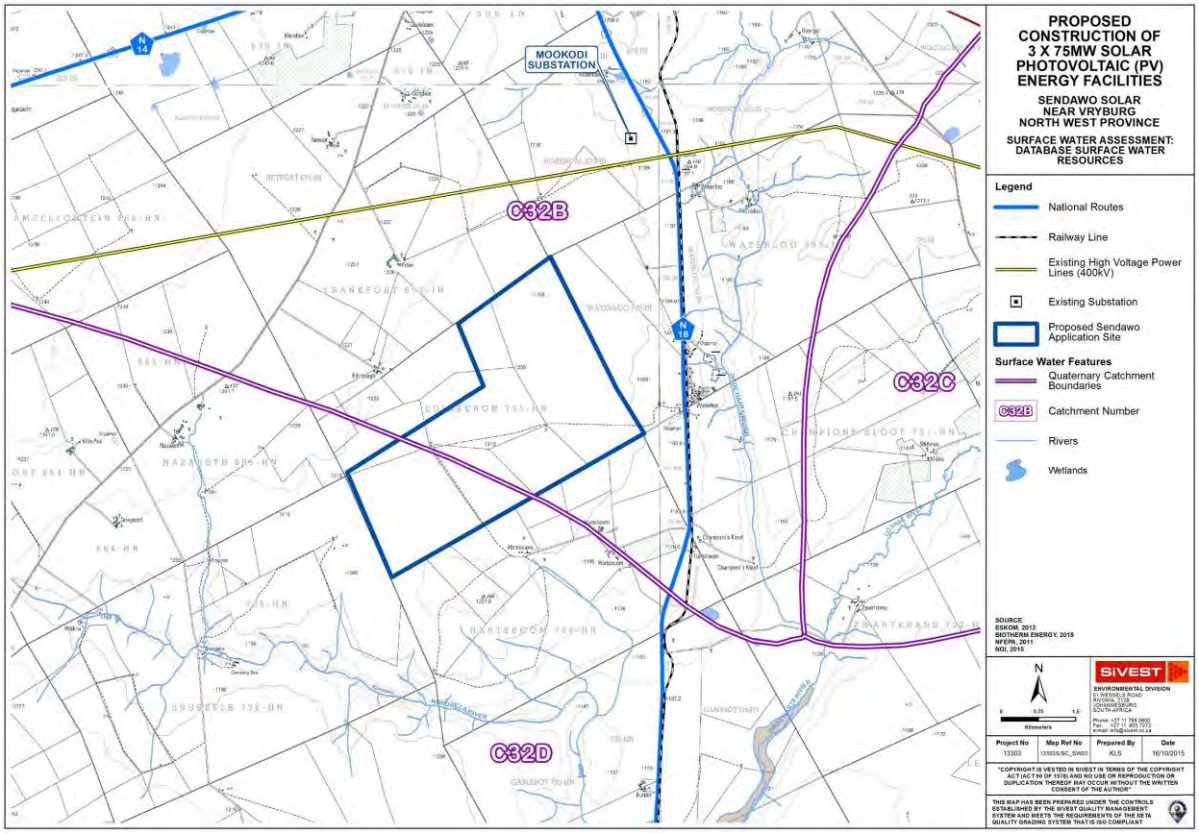

Figure 17: Database surface water resources for the Sendawo solar PV energy facility application site

5.9.2 Desktop Surface Water Resource Occurrence in the Study Area

Utilising the database findings above, Google™ satellite imagery overlaid with 1:50 000 topographical images were consulted to refine/confirm surface water resources that were identified. Several drainage lines and potential surface water resources were apparent and could be delineated for the all-inclusive study area. In summary, it was found that there were a total of (**Figure 18**):

- Two (2) NFEPA identified rivers, namely the Droe Harts and Korobela;
- Two (2) first order stream/river segments of the downstream Droe Harts River which pass through the north of the study area;
- Twelve (12) valley bottom wetlands (channelled and un-channelled); and
- Twenty two (22) depression wetlands.

The database and desktop findings verify the presence of the two (2) NFEPA identified rivers, namely the Droe Harts and Korobela, as well as the un-channelled valley bottom wetland located within close proximity to the study area. However, from what had been observed in the desktop findings, two (2) stream segments of the Droe Harts River were found to cross the northern part of the study area. Additionally, the database findings identified the presence of approximately thirty four (34) surface water features which were considered to be either depression or valley bottom wetlands. Seventeen (17) of

these were located within the study area, whilst the remaining could be identified in relative close proximity (approximately 2km radius around the study site). It must be noted, however, that from a desktop findings perspective, some of these wetland systems appeared to be connected as one greater system while others appeared to be separate and isolated systems. An in-field site visit involving a ground-truthing exercise will need to be undertaken to verify the database and desktop findings.

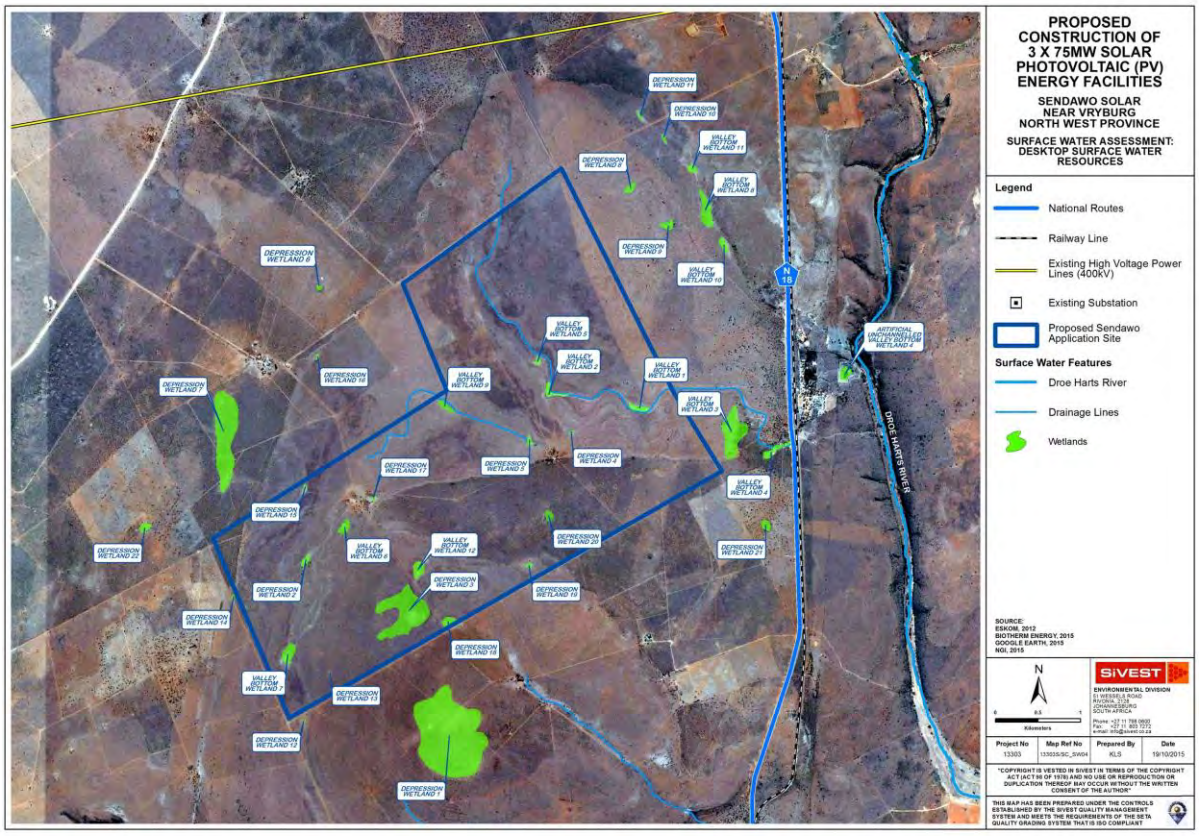

Figure 18: Desktop surface water resources for the Sendawo solar PV energy facilities application site

5.10 Soils and Agricultural Potential

The Soils and Agricultural Potential Assessment was conducted by D.G. Paterson. The full report is included in Appendix 6D. The environmental baseline from a soils and agricultural perspective is presented below.

5.10.1 Soils

Existing soil information was obtained from the map sheet 2624 Vryburg (Eloff et al., 1978) from the national Land Type Survey, published at 1:250 000 scale. A **land type** is defined as an area with a

uniform terrain type, macroclimate and broad soil pattern. The soils are classified according to MacVicar et al (1977).

The area under investigation is covered by only one land types, as shown on the map in the soils and agriculture specialist report, namely:

- **Ae36** (Red, freely-drained soils, high base status)

It should be clearly noted that, since the information contained in the land type survey is of a reconnaissance nature, only the general dominance of the soils in the landscape can be given, and not the actual areas of occurrence within a specific land type. Also, other soils that were not identified due to the scale of the survey may also occur. **The site was not visited during the course of this study, and so the detailed composition of the specific land types has not been ground-truthed.**

A summary of the dominant soil characteristics of each land type is given in **Table 12** below.

The distribution of soils with high, medium and low agricultural potential within each land type is also given, with the dominant class shown in **bold type.**

5.10.2 Soil Pattern

The soils are all shallow to very shallow (<500 mm), usually sandy and calcareous, overlying either rock or cemented hardpan calcrete. Some rock outcrops occur in places in the landscape.

The occurrence and distribution of the land types is shown in the soils and agriculture specialist report.

A summary of the dominant soil characteristics is given in **Table 12** below.

Table 12: Land types occurring (with soils in order of dominance)

Land Type	Depth (mm)	Dominant soils	Percent of land type	Characteristics	Agric. Potential* (%)
Ae36	300-400 100-200	Hutton 36 Mispah 10/12/22 Rock	24% 17% 15%	Red, sandy loam soils on rock or saprolite Brown, sandy loam topsoils, on rock or hardpan calcrete	High: 2.8 Mod: 9.1 **Low: 11.9**

*Note: Agricultural Potential refers to **soil characteristics only**, without potentially restricting climatic factors

5.10.3 Agricultural Potential

Virtually all of the study area comprises shallow, calcareous soils with rock (land type Ae36), as can be seen from the information contained in **Table 12** and the Soils and Agriculture specialist report.

Coupled with these shallow soils, the very low rainfall in the area means that the only means of cultivation would be by irrigation and the Google Earth image of the area (**Figure 19**) shows absolutely no signs of any agricultural infrastructure and certainly none of irrigation.

Figure 19: Google Earth image of study area

The climatic parameters mean that this part of North West is well suited for grazing but here the grazing capacity is relatively low, around 12 ha/large stock unit (ARC-ISCW, 2004).

- Land Use

The land use in the area is dominantly “shrubland and low fynbos” with some small areas of “bare rock and soil (natural)” as classified by the National Land Cover (Thompson, 1999). As previously mentioned, there are no areas of cultivation that were identified, only a few small, isolated areas of “Improved grassland”.

5.11 Visual

The Visual Assessment was conducted by Kerry Schwartz and Andrea Gibb at SiVEST. The full report is included in Appendix 6E. The environmental baseline from a visual perspective is presented below.

The physical and land use related characteristics are outlined below as they are important factors contributing to the visibility of a development and visual character of the study area. Defining the visual character is an important part of assessing visual impacts as it establishes the visual baseline or existing visual environment in which the development would be constructed. The visual impact of a development is measured according to this visual baseline by establishing the degree to which the development would contrast or conform with the visual character of the surrounding area. The inherent sensitivity of the area to visual impacts or visual sensitivity is thereafter determined, based on the visual character, economic importance of the scenic quality of the area, inherent cultural value of the area and presence of visual receptors.

5.11.1 Topography

The very flat nature of the topography is a strong factor influencing the types of vistas typically present in the study area, as there are few areas of rising ground to block views and limit viewsheds. Views are only likely to be partially restricted in the river valleys in the eastern and southern sectors of the study area. As a result, typically wide-ranging vistas are experienced within the study area, especially from locally higher elevations.

5.11.2 Vegetation

The predominant very low shrub layer and open areas of cultivated fields / grasslands results in wide-open vistas across most of the study area. Only in areas where artificial wooded vegetation has been established around farmhouses, would the vegetation provide visual screening. The relatively low density human habitation and natural vegetation cover across large portions of the study area would give the viewer the general impression of a largely natural rural setting.

5.11.3 Land Use

As stated above, sparse human habitation and the predominance of natural vegetation cover across large portions of the study area would give the viewer the general impression of a largely natural rural setting. High levels of human transformation and visual degradation only become evident in the northern sector of the study area where the N18 approaches Huhudi and the outskirts of Vryburg.

The influence of the level of human transformation on the visual character of the area is described in more detail below.

5.11.4 Visual Character and Cultural Value

Visual character can be defined based on the level of change or transformation from a completely natural setting, which would represent a natural baseline in which there is little evidence of human transformation of the landscape. Varying degrees of human transformation of a landscape would engender differing visual characteristics to that landscape, with a highly modified urban or industrial

landscape being at the opposite end of the scale to a largely natural undisturbed landscape. Visual character is also influenced by the presence of built infrastructure such as buildings, roads and other objects such as electrical infrastructure.

As mentioned above, much of the study area is characterised by rural areas with low densities of human settlement. Agriculture in the form of livestock grazing is the dominant land use, which has transformed the natural vegetation in some areas. However, a large portion of the study area has retained a natural appearance due to the presence of the low shrubs and taller trees dominated by camel thorn (*Acacia erioloba*). The most prominent anthropogenic elements in these areas include the N18 national route, power lines, a new transmission substation and other linear elements, such as telephone poles, communication poles and farm boundary fences. The presence of this infrastructure is an important factor in this context, as the introduction of the proposed PV energy facility would result in less visual contrast where other anthropogenic elements are already present. Other human infrastructure in this setting occurs at a low density, and includes several gravel access roads and one north-south aligned railway line running parallel to the N18. Overall, the study area has a natural visual character, with certain areas displaying a rural or pastoral component where maize cultivation and farmsteads occur.

The relatively low density of human transformation throughout the surrounding area is an important component contributing to the largely natural visual character of the study area. This is important in the context of potential visual impacts associated with the proposed development of a PV energy facility as introducing this type of development could be considered to be a degrading factor in this context.

It should however be noted that other solar energy facilities are proposed in relatively close proximity to the proposed development. These facilities and their associated infrastructure, typically consist of very large structures which are highly visible. As such, these facilities will significantly alter the visual character and baseline in the study area if constructed and make it appear to have a more industrial-type visual character.

5.11.5 Visual Sensitivity

Visual Sensitivity can be defined as the inherent sensitivity of an area to potential visual impacts associated with a proposed development. It is based on the physical characteristics of the area (i.e. topography, landform and land cover), spatial distribution of potential receptors, and the likely value judgements of these receptors towards a new development (Oberholzer: 2005). A viewer's perception is usually based on the perceived aesthetic appeal of an area and on the presence of economic activities (such as recreational tourism) which may be based on this aesthetic appeal.

In order to assess the visual sensitivity of the area SiVEST has developed a matrix based on the characteristics of the receiving environment which, according to the Guidelines for Involving Visual and Aesthetic Specialists in the EIA Processes, indicate that visibility and aesthetics are likely to be 'key issues' (Oberholzer: 2005).

Based on the criteria in the matrix (**Table 13**), the visual sensitivity of the area is broken up into a number of categories, as described below:

i) **High** - The introduction of a new development such as a solar energy facility would be likely to be perceived negatively by receptors in this area; it would be considered to be a visual intrusion and may elicit opposition from these receptors

ii) **Moderate** - Presence of receptors, but due to the nature of the existing visual character of the area and likely value judgements of receptors, there would be limited negative perception towards the new development as a source of visual impact.

iii) **Low** - The introduction of a new development would not be perceived to be negative, there would be little opposition or negative perception towards it.

The table below outlines the factors used to rate the visual sensitivity of the study area. The ratings are specific to the visual context of the receiving environment within the study area.

Table 13: Environmental factors used to define visual sensitivity of the study area

FACTORS	RATING									
	1	2	3	4	5	6	7	8	9	10
Pristine / natural character of the environment										
Presence of sensitive visual receptors										
Aesthetic sense of place / scenic visual character										
Value to individuals / society										
Irreplaceability / uniqueness / scarcity value										
Cultural or symbolic meaning										
Scenic resources present in the study area										
Protected / conservation areas in the study area										
Sites of special interest present in the study area										
Economic dependency on scenic quality										
Local jobs created by scenic quality of the area										
International status of the environment										
Provincial / regional status of the environment										
Local status of the environment										
**Scenic quality under threat / at risk of change										

**Any rating above '5' will trigger the need to undertake an assessment of cumulative visual impacts.

Low							Moderate							High
10	20	30	40	50	60	70	80	90	100	110	120	130	140	150

Based on the above factors, the assessment area is rated as having a low to moderate visual sensitivity. This is mainly owing to the relatively uninhabited character of the area and the presence of road, rail and electricity transmission infrastructure which would likely reduce the scenic quality of the area. An important factor contributing to the visual sensitivity of an area is the presence, or absence of visual receptors that may value the aesthetic quality of the landscape and depend on it to produce revenue and create jobs.

*Other solar energy facilities are proposed within relatively close proximity to the proposed project. As such, an assessment of the cumulative impact that will be experienced from each potentially sensitive receptor will be undertaken in the next phase of this study, once the sensitive receptor locations have been confirmed.

5.12 Heritage

The Heritage Assessment was conducted by Wouter Fourie of Professional Grave Solutions. The full report is included in Appendix 6F. The environmental baseline from a heritage perspective is presented below.

The examination of heritage databases, historical data and cartographic resources represents a critical additional tool for locating and identifying heritage resources and in determining the historical and cultural context of the study area. Therefore an Internet literature search was conducted and relevant archaeological and historical texts were also consulted. Relevant topographic maps and satellite imagery were studied.

5.12.1 Archival findings

- *Overview of the archaeological fabric of the study area and surroundings*

A small number of archaeological and heritage contract projects have been undertaken in the general surroundings of the study area. Of the three heritage studies located in this area, two were undertaken for proposed photovoltaic solar farms and one for an extension to an existing base metal mine. No purely academic archaeological research appears to have taken place in the direct vicinity of the study area, with the nearest known research locality the Taung Skull World Heritage Site situated 18.4 km south-east of the present study area. It is important to note that the information listed here does not necessarily represent all the previous archaeological work undertaken in the vicinity of the study area. The second source is information from reports that were accessed from the SAHRA electronic database known as SAHRIS, and which for the most part came about due to the requirement for archaeological and heritage impact assessments to be undertaken for mining (and other development) activities.

- *Archaeological Sites as Revealed Through a Study of Published Literature*

The following sites were identified by studying archaeological journals and books. The sites are grouped according to their respective farm names. At the end of each description the approximate distance between the site and the present study area is provided. No information could however be obtained with regard to any archaeological research that was undertaken in close proximity to the study area. In the surrounding landscape the following archaeological sites are known:

Taung

In 1924 Raymond Dart identified the skull of an infant gracile australopithecine from a limestone quarry near Taung. While numerous fossils have been recovered from the same quarry, the skull of the Taung Child is the only hominin remains recovered from this site. Taung is one of only three localities in South Africa where fossil evidence for early hominins were ever recovered, the other two being the Cradle of Humankind (with sites such as Sterkfontein and Kromdraai) and Makapansgat (Mitchell, 2002). The Taung Skull World Heritage Site is located 70 km south of the present study area.

Harts River Valley Survey Project

In 1989 the University of the Witwatersrand was commissioned to conduct an archaeological survey of a section of the Harts River valley that was scheduled to be flooded by the proposed construction of the Taung Dam. A total of 28 Stone Age and three pastoralist sites were identified during the survey. Of the 38 identified Stone Age sites, a total of 11 could be associated with the Early Stone Age.

The best-preserved sites identified during the survey were excavated in 1992, including two of the Early Stone Age sites namely 2724DB3 and 2724DB4. Incidentally, the research undertaken at these two sites has provided valuable insight into the Acheulian archaeology of South Africa. In the words of Prof. Kathleen Kuman (2001:20), the "*...Harts Valley project provides further documentation for the South African part of this picture of technological continuity and the origins of prepared core technology within the Achuelian".*

Seven rock art sites were also identified in the footprint area of the proposed Taung Dam. These seven sites comprise finger paintings of geometric patterns as well as one site which contains paintings of "*...riders on horseback...riders on horseback chasing an elephant...and two geometric patterns"* (Dowson et.al., 1992:28).

If any of these sites identified before the construction of the Taung Dam still exists, they would be located roughly 60 km south east of the present study area.

Figure 20: Tracing of one of the rock art panels at a site located roughly 40 km east of the present study area (Dowson, et.al., 1992: 29).

The aim of the archival background research is to identify possible heritage resources that could be encountered during the field work, as summarised in **Table 14**.

Table 14: Summary of History of Vryburg Town and Surrounding Area

DATE	DESCRIPTION
2.5 million to 250,000 years ago	The Earlier Stone Age (ESA) is the first and oldest phase identified in South Africa's archaeological history and comprises two technological phases. The earliest of these technological phases is known as Oldowan which is associated with crude flakes and hammer stones and dates to approximately 2 million years ago. The second technological phase in the Earlier Stone Age of Southern Africa is known as the Acheulian and comprises more refined and better made stone artefacts such as the cleaver and bifacial handaxe. The Acheulian phase dates back to approximately 1.5 million years ago. A total of 11 Early Stone Age sites with Acheulian lithics have been recorded in the Harts River valley, immediately east of the town of Taung and roughly 60 km east of the present study area (Kuman, 2001).
250,000 to 40,000 years ago	The Middle Stone Age is the second oldest phase identified in South Africa's archaeological history. It is associated with flakes, points and blades manufactured by means of the prepared core technique.

40,000 years ago to the historic past	The Later Stone Age is the third phase in South Africa's Stone Age history. It is associated with an abundance of very small stone artefacts (microliths). The Later Stone Age is also associated with rock engravings and rock paintings. Rock engravings are known from the wider vicinity of the study area (Bergh, 1998), with one known site located at Dinkweneng (roughly 43 km east of the study area). Furthermore, a Low Density Surface Scatter of Later Stone Age material was identified at the Pering Mine (approximately 60 km south-west of the study area) (Birkholtz, 2011).
Early 1600s	The Tswana groups known as the Thlaping and Thlaro moved southward into the area presently known as the Northern Cape. A century later they were settled in areas as far south as Majeng (Langeberg), Tsantsabane (Postmasburg) and Tlhaka le Tlou (Danielskuil) (Snyman, 1986).
c. 1770	The Kora moved into the area. Due to their superior firearms they applied increasing pressure on the Thlaping and Thlaro groups. In the end the Thlaping moved into a north-eastern direction to settle in the general vicinity of Dithakong, north-east of present-day Kuruman. The Thlaro settled in areas to the west and north-west of the Thlaping (Snyman, 1986).
c. 1795	Legassick (2010) confirms the presence of the Thlaping, Thlaro and Kora in the general vicinity of the study area during this time.
Early 1800s	After the threat of the Kora became less intensive the Thlaping moved to the vicinity of present-day Kuruman. The Thlaro returned to the Langeberg, establishing them on a permanent basis there during the 1820s (Snyman, 1986). During this time German-born deserter Jan Bloem and his followers established themselves at Lekatlong (Legassick, 2010).
1833	Hurutshe refugees established themselves at Taungs (Legassick, 2010). The present-day town of Taung is roughly 40 km due-south of the study area.
1834	Mahura and his Thlaping followers moved from the vicinity of Kuruman to Taungs. Apart from the 1,500 individuals that followed Mahura to Taungs, the settlement of Taungs at the time also included some 2,000 Hurutshe, the Kora leader Mosweu Taaibosch and his followers as well as some 1,500 Maidi (Legassick, 2010).
November 1840	Gasibonwe, the son of Mothibi, attacked Mahura's cattle posts at Taungs and further afield. His aim was to degenerate Mahura's rule and to achieve supremacy over all the Thlaping (Legassick, 2010).
22 April 1842	A treaty was signed between Griqua leader Andries Waterboer and Thlaping leader Mahura at Mahura's settlement near Taungs. The agreement included a definition of the boundary between the two groups. The section of the agreed upon boundary closest to the study area ran from Danielskuil to Boetsap, which meant that the study area was defined as part of this treaty as forming part of Thlaping land (Legassick, 2010). This boundary was very similar to an earlier one that was thought to have been agreed to during the 1820s as a boundary between the Griqua and the Thlaping (Legassick, 2010).

1867	Diamonds were discovered for the first time in South Africa near Hopetown. Alluvial diamonds were also discovered along both banks of the Orange River in the vicinity of the confluence of the Vaal and Harts Rivers (Van Staden, 1983). This resulted in large numbers of fortune seekers streaming into the area from overseas, which would have had a profound impact on the social-dynamics of the landscape.
27 October 1871	The area located in the triangle formed by the Orange and Vaal Rivers was proclaimed as British Territory and named Griqualand West. This proclamation came as a result of ownership disputes between the Griqua, the Boer Republic of the Orange Free State and the Boer Republic of the Zuid-Afrikaansche Republiek in terms of the newly discovered diamond diggings (www. wikipedia.com).
1879	After Barend Barends was defeated by the Khumalo Ndebele of Mzilikazi, Boetsap was occupied by two shopkeepers, Hunter and Tasker.
1882-1885	The Boer Republic of Stellaland existed during this time in the general area of the Vryburg district. Stellaland had its roots in the conflict between Mankurwane's Tlhaping and Mosweu's Kora over land. Both sides used white mercenaries who as part of their remuneration were to receive farms. Almost 300 Boers joined the side of Mosweu in this war and on 26 July 1882 Mankurwane sued for peace. As a result of the peace agreement a portion of land was set aside for the mercenaries. From September 1882 the capital of Stellaland was being laid out and named Vryburg. On 6 August 1883 the Republic of Stellaland was proclaimed. However, the republic seized to exist when Sir Charles Warren proclaimed the Bechuanaland Protectorate on 30 September 1885 (Bergh, 1999). The Taungs area, including the farm Brakfontein, was located just outside the southern boundary of Stellaland.
30 September 1885	Sir Charles Warren proclaims British Bechuanaland. This proclaimed area included the study area (www.wikipedia.com).
1895	British Bechuanaland was incorporated into the Cape of Good Hope (www.wikipedia.com). The study area now fell within the Cape of Good Hope. In the same year the Kaukwe Native Reserve was established in accordance with British Bechuanaland Proclamation No. 220 (Breutz, 1986). This reserve is located 60km south-west of the present study area
1904	Reverend William Charles Willoughby and his wife Bessie arrives in the vicinity of the current study area with the aim of assisting the Batswana to establish a school in Bechuanaland. After several attempts the Institution was finally established at Tiger Kloof. http://www.tigerkloof.com/index.php/about-us/history

- *Findings of the background research*

The pre-history of the area is evident through the presence of numerous farms with rock engravings, including Verdwaal Vlakte, Bernauw, Schatkist, Wonderfontein and Kinderdam (Van Schalkwyk, 2012; Morris, 1998).

The numerous dry pans in the northern section of the study area also increase the probability of finding Stone Age Sites associated with hunter gatherer subsistence.

Heritage Resources associated with the South African War can be traced through the presence of blockhouse lines between Taung and Vryburg and onwards towards Madibogo, as well as the Vryburg concentration camp situated on the Vryburg Allotment area that is now part of the Leon Taljaard Nature Reserve to the north west of Vryburg.

Other areas of significance identified are the Devondale Mission (*circa* pre-1900), Tiger Kloof Institute (*circa* 1904) as well as the farmstead of the first and only president, Gerrit Jacobus van Niekerk, of the republic of Stellaland on the farm Niekerksrus. some 36 kilometres northwest of Vryburg.

Themes identified during the research were:

- Palaeontology
- Pre-colonial archaeology and early inhabitants – especially associated with inland water in the arid regions of South Africa
- Early Colonial History and settlement
- Routes and transport
- Military history
- Town and village formation

5.12.2 Palaeontology

The palaeontological resources in the Vryburg area have received very little scientific attention. To a great extent they can only be inferred from the rock units represented there on geological maps. Most of the potentially fossiliferous superficial deposits (e.g. Caenozoic alluvium) are not shown on the published geological maps, however.

Stromatolitic carbonate rocks (limestones, dolomites) of Early Precambrian (Archaean) age in outcrops of the Ventersdorp Group (Kameeldorns, Rietgat and Bothaville Formations) as well as the lower part of the Transvaal Supergroup (Ghaap Group, Vryburg Formation & Schmidtsdrift Subgroup, including the Boomplaas Formation). In the Vryburg area and further south towards Taung these include some of the oldest (> 2.5 billion years) and best-preserved stromatolites (fossil microbial mounds) known from this period;

Stromatolites are recorded from the dolomite layers. Highly fossiliferous Caenozoic cave breccias are also known to occur within the dolomite layers, but are not mapped individually. These fossiliferous deposits often contain more recent mammal and hominid fossils, e.g. in the Cradle of Humankind."

- *Findings from the studies*

Through the analysis of the aerial photographs and available maps of the study area no obvious heritage sensitive areas were identified inside the study area. Some rocky outcrops that could possibly contain rock engravings and open air stone age sites have been identified as possible heritage sensitive areas. **Figure 21** Indicates the possible heritage sensitive areas.

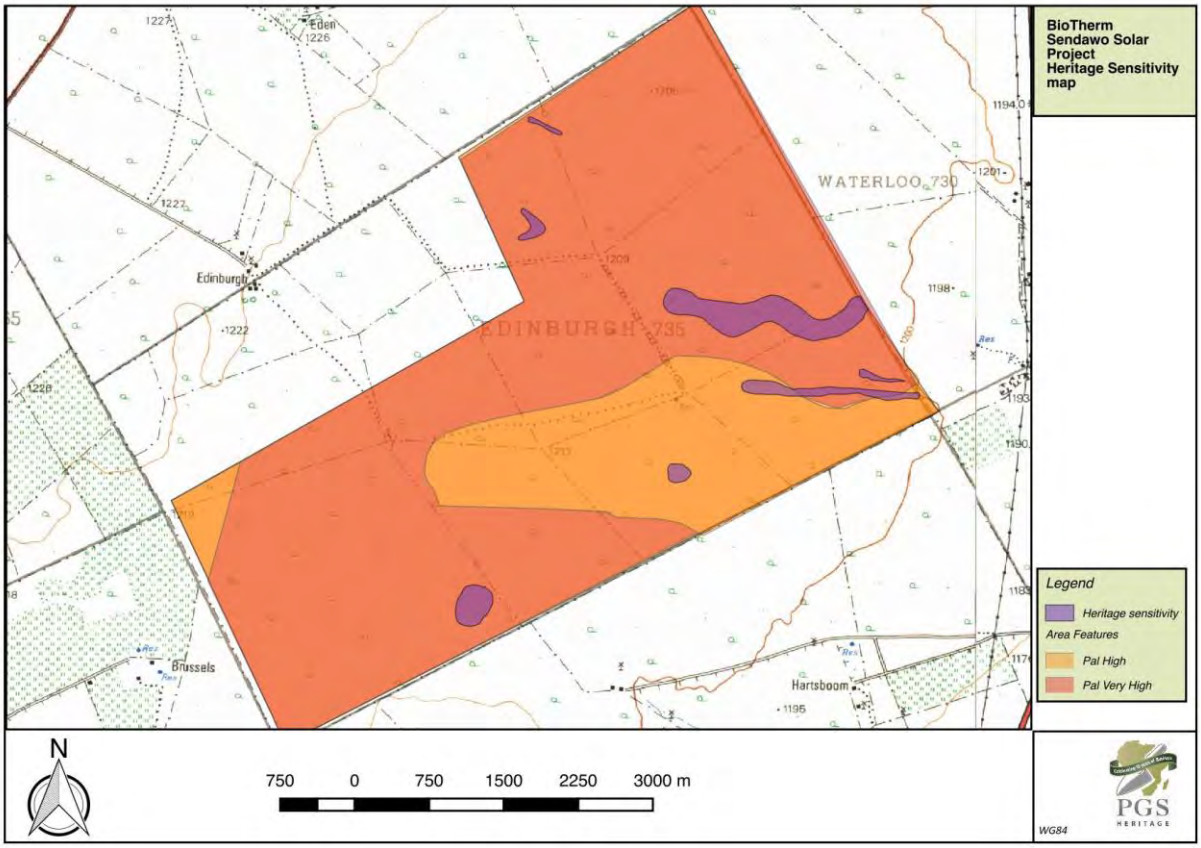

Figure 21: Sendawo Solar heritage sensitivity map

To be able to compile a heritage management plan to be incorporated into the Environmental Management Plan the following further work will be required for the EIA.

- Archaeological walk through of the areas where the project will be impacting;
- Full Palaeontological Impact Assessment, the entails fieldwork and assessment of the potential impacts of the findings of such fieldwork;

5.13 Socio-economic Environment

The Socio-economic Assessment was conducted by Mariette Steynberg of Urban-Econ Development Economists. The full report is included in Appendix 6G. The environmental baseline from a socio-economic perspective is presented below.

This section examines key socio-economic characteristics of the study area. This is essential as it provides both qualitative and quantitative data related to the economies and communities being studied.

The outcome is a baseline against which the potential impacts, both positive and negative resulting from the proposed project, can be studied and analysed.

5.13.1 Study area's composition

- *Spatial context and regional linkages*

The proposed Sendawo Solar PV project is located south of Vryburg in the Naledi LM. Vryburg hosts Naledi LM's administrative centre, and is considered the agricultural and industrial centre of the Dr. Ruth S. Mompati DM. The Naledi LM comprises approximately 15% of the total land area of the DM, and is the most significant employment creator and GDP contributor in the district. This is chiefly due to the fact that the town hosts the third largest agricultural show in South Africa.

The Naledi LM is one of five local municipalities in the Dr. Ruth S, Mompati DM. The DM borders with Botswana to the north, the Ngaka Modiri Molema DM to the north-east, Dr. Kenneth Kaunda DM to the south-east, the Free State Province to the south-east, and the Northern Cape Province to the south and west.

The town of Vryburg is situated on the N14 national road, running from the Gauteng Province through Vryburg, Kuruman, and Upington, and connecting Gauteng to the mining town Springbok in the Northern Cape. This regional linkage is further strengthened by the fact that the road also links Gauteng to Namibia. Vryburg is also located on main railway lines connecting Cape Town to Botswana and Zimbabwe.

- *Towns and Settlements*

The closest town to the proposed Sendawo project is the town of Vryburg. The town is situated halfway between Kimberley and Mafikeng and is the administrative centre of the DM. It is also considered the economic heartbeat of the region due to its agricultural activities.

Vryburg was founded on September 20th 1882, and by February of 1883 some 400 farms had been established. Stella is located north-east of Vryburg, while the township Huhudi is located just south of the town. In 1904 the London Missionary Society established the Tiger Kloof Native Institute south of Vryburg; the stone church on the premises is a national monument. The town is rich in cultural history, with the Theiler Museum located 8 km west of Vryburg. The museum houses a collection of the equipment used by Sir Arnold Theiler, the veterinarian who established the Onderstepoort veterinary research institute near Pretoria.

Other settlements in proximity to the proposed project side include:

- Pudimoe;
- Huhudi;
- Schweizer-Reneke;
- Hartswater;

- Bloemhof;
- Wolmaranstad;
- Christiana; and
- Hoopstad.

- *Resources and land capability*

Vryburg is South Africa's largest beef producing district. Other important agricultural activities include the production of maize and peanuts. The town is considered the agricultural and industrial centre of the Dr. Ruth S. Mogomotsi DM, being the districts biggest employment generator and GDP contributor. The importance of the agricultural sector in the town is further highlighted by the fact that the town is host to South Africa's third biggest agricultural show.

The town has been identified as a second priority investment location, and is ideally located on important regional linkage such as the N14 connecting Gauteng to the Northern Cape, as well as key railway lines. Based on its location, policy makers have identified Vryburg as ideal for establishing a primary regional node.

Furthermore, the location of Vryburg also presents significant income opportunities from tourism. The town is located on the N14, which eventually links Gauteng to Namibia. This in itself represents a possibility for entrepreneurs to earn income from passing tourists. Additionally, the town's rich cultural heritage could be better marketed as a tourism attraction, (it houses the Thiel Museum and a stone church that was declared a national monument). According to the Naledi LM IDP, the western part of Vryburg is also utilised as a nature reserve, a factor that could attract additional tourists.

- *Land-uses within the affected zone of influence*

The Sendawo Solar PV energy facility is proposed to be established on Portion 1 farm Edinburgh 735, near Vryburg in the North West Province. **Table 15** summarises the information that was gathered from initial consultation with the affected land owner. Further consultation in the EIA phase is expected to reveal more information, and it is also expected that consultations with the owners of land adjacent to the proposed project site will take place then. This will provide further information on the possible impact of the proposed project on indirectly affected parties.

As mentioned, consultation with the owners of land adjacent to the project site will take place in the EIA phase of the project. Regardless, Google Earth imagery suggest that the proposed project site is surrounded by grazing land with scattered farmsteads visible. North-East of the proposed site a road traverses north to south-east with a school or sports complex bordering the site.

Table 15: Land use profile of the affected farm portions

Farm	Owner/contact details	Type of effect	Information

Portion 1 of Farm Edinburgh 735	Edinburgh Trust – Adele Oberholzer: 0823386196 blackwoodal2@gmail.com	Directly affected – PV site	• 200 ha of the farm will be used for the proposed project, it is not envisioned to impact current economic activities. • Cattle and game breeding is taking place. • There is a homestead on the land, occupation numbers vary – land owner was not prepared to disclose the numbers due to security reasons. • No relocation is envisioned. • Land owner is in favour of the project as long as the contract stipulations are adhered to.

5.13.2 Demographic Profile and Income Levels

The population of any geographical area is the cornerstone of the development process, as it affects the economic growth through the provision of labour and entrepreneurial skills, and determines the demand for the production output. Examining population dynamics is essential in gaining an accurate perspective of those who are likely to be affected by any prospective development or project.

According to the 2011 National Census, 21 183 individuals reside in 5 526 households in Vryburg. The Naledi LM, which in land size comprises 15% of the Dr. Ruth S. Mompati DM's total land area, has a total population of 66 779 individuals or 18 570 households (Stats SA). This is equal to 14.4% of the DM's population, roughly on par with the land area of the LM.

It is estimated that approximately 19% of the population of the Naledi LM reside on farms. When compared to the 9.45% and 5.3% of the DM, and country's respective populations, the relative importance and size of the agricultural activities taking place in the Naledi LM is again highlighted. As identified in the policy documents reviewed, the Naledi LM and more specifically Vryburg is considered the biggest beef producer in the country. The fact that Vryburg is the administrative centre as well as industry hub of the DM is reflected in the fact that the Naledi LM has only 4.1% of its households living on tribal land or in rural regions, compared to the 55.6% of the households of the Dr. Ruth S. Mompati DM living in rural regions.

The racial mix in the DM follows that of the province more closely, while there is more similarities between the Naledi LM and the country. It is estimated that 79% of South Africa's population is African, while in the LM 74.5% of the population is African. In the DM and province the demographic is distinctly different, with 91.5% and 90% of the respective populations classified as African. The next biggest population group in the municipalities being studied is Coloured, with 14.5% of the LM's population, and 3.9% of those living in the DM from this racial group. 9.4% Of the population of the LM is White while 3.9% of the DM's population is White. The population of Vryburg is slightly more diversified; here 41.7% is African, 37.2% is Coloured, and 17.6% is White. The town also has the biggest Indian/Asian population of all the study communities, and it is estimated that 2.8% of Vryburg's population is of Indian or Asian decent (Stats SA)

Based on Census 2011 data, more than half (54%) of the population of Vryburg is Afrikaans speaking, a further 31.8% speaks Setswana, and 6.28% speaks of Vryburg's population considers English to be their mother tongue. The dynamic changes slightly in the study municipalities; in the LM 67.7% of the population has Setswana as home language with even more in the DM (82.8%), speaking Setswana. Other prominent home languages in these municipalities are Afrikaans and English, although spoken on a much smaller scale than in Vryburg (Stats SA).

There are more females (51.9%), than males (48.1%) in the Vryburg population. This follows the pattern of the DM closely; here 48.5% of the population is male and 51.5% is female. In the LM the situation is different, although the ratio between male and female is more equal in the Naledi LM, there are still slightly more males than females (50.3% vs. 49.7%). A study area's dependency ratio can be defined as the proportion of the population who will be dependent on the economically active population, thus individuals aged 0 – 14 years and 65 and older. Based on these qualifications, it can be estimated that roughly 34.5% of South Africa's population can be classified as dependants. In Vryburg this ratio is fairly on par – 34.9% of the population is aged 0 – 14 years or older than 65 years. However, in the LM and DM, the working age population is considerably smaller, leading to a larger proportion of the respective populations who can be considered dependants; 36% in the LM, and 41.6% in the DM (Stats SA). This could be seen as a development constraint since the social needs would be higher in these communities.

In the Dr. Ruth S. Mompati DM literacy levels are worrisome; here 21% of the population aged 20 years and older has had no formal education, with 22.2% achieving only a slightly better level of literacy by completing some primary schooling. Moreover, only 16.8% of the population of the DM, aged 20 and older, has been able to successfully complete matric. The situation in the Naledi LM is less dire but still suggestive of a community with low literacy levels. In the LM, 21.5% of the population has achieved a matric qualification, while 16.5% of the population aged 20 years and older has had no formal education and 16.8% has had some primary schooling. Literacy levels in Vryburg are above the national average, it is estimated that 26.5% of the population aged 20 years and older successfully completed matric with a further 15% obtaining a tertiary education; however, there is still 8.8% of Vryburg's population, aged 20 and older, who has had no education (Stats SA).

In Vryburg the average monthly household income is R12 462, which is significantly more than the average national household income of R9 235 per month. The broader population of the study area is earning considerably less, with the average monthly income for the DM and LM at R4 320 and R7 168, respectively, per household (Stats SA). The lower than average national income levels could be indicative of a limited number of job opportunities available, which in turn is associated with a smaller than average economic base. At the same time, the high earnings in Vryburg are easily explainable when referring to the region's dominance in beef production.

The fact that opportunities in Vryburg are more readily available and of a better quality than the rest of the study areas, is evident when looking in greater detail at the average household income data. Nationally it is estimated that 14.9% of households do not have any regular income. In Vryburg this figure is at 10.5% with 46.4% of the households earning less than R3 200 per month. In the LM 12.9%

of households have no access to income, while 66.6% survive on less than R3 200 per month. In the DM the situation is much direr; here 17% of the households do not have an income, with 78.5% of households earning less than R3 200 per month (Stats SA). The relatively low income levels can be seen as an indication of a small tax base, which presents service delivery challenges for the study municipalities.

5.13.3 Economy and its dynamics

The structure of the economy and the composition of its employment provides valuable insight into the dependency of an area on specific sectors and its sensitivity to fluctuations of global and regional markets. Knowledge of the structure and the size of each sector is also important for the economic impact results' interpretation, as it allows for an assessment of the extent to which the proposed activity would change the economy, its structure, and trends of specific sectors.

The economy of the Naledi LM is valued at R2 857 million in current prices; that is a contribution of 27.3% to the economy of the Dr. Ruth S. Mompati DM, (valued at R10 457 million in current prices), or 1.4% contribution to the R199 551 million North West Province's economy (Quantec, 2014). Based on these estimates, it can be stated that the economy of the North West Province contributes approximately 6.5% to the national economy.

Based on constant prices it is estimated that the economy of Naledi LM grew by a Compounded Annual Growth Rate (CAGR), of 2.1% over the ten year period between 2003 and 2013. This is below the average national CAGR for the same period of 3.3%, but on par with the Province's growth rate (2.2%). At the same time the growth rate in the DM was recorded as 1.5% (Quantec, 2014). In the LM the construction sector showed the most significant growth at 12%, while the transport sector grew at a CAGR of 5.4%. Over the same period the primary sector decreased by 5.2%, driven by a 5.1% decline in the agricultural sector and a 7.2% decline in the mining sector.

The economies of the primary study area's municipalities are predominantly service economies, with 85.6% and 78.2% of the LM and DM's respective economies' GDP in current prices generated by the tertiary sector. This is well above the national average, as 70.5% of South Africa's GDP at current prices is generated by the tertiary sector. As seen in **Table 16**, the importance of the general government sector in the study area's municipalities is substantially more than in the province and South Africa. In the Naledi LM 29.3% of the current GDP was generated by the government sector, while a quarter of the DM's GDP at current prices was generated by this sector. Vryburg, is the administrative seat of the district, which explains the higher than average contribution by the government sector to the GDP of the LM.

Table 16: Economic structure of the various delineated study areas

Economic Sector	Dr. Ruth S. Mompati DM		Naledi LM	
	GDP in current prices (R'm)	% of GDP	GDP in current prices (R'm)	% of GDP
Agriculture	R710	6.8%	R101	3.5%
Mining and quarrying	R543	5.2%	R10	0.4%

Economic Sector	Dr. Ruth S. Mompati DM		Naledi LM	
	GDP in current prices (R'm)	% of GDP	GDP in current prices (R'm)	% of GDP
Manufacturing	R452	4.3%	R112	3.9%
Electricity, gas and water	R248	2.4%	R85	3.0%
Construction	R330	3.2%	R104	3.6%
Trade	R1 323	12.6 %	R365	12.8 %
Transport and communication	R896	8.6%	R364	12.7 %
Finance and business services	R1 640	15.7 %	R551	19.3 %
Personal services	R1 688	16.1 %	R327	11.5 %
General government	R2 628	25.1 %	R838	29.3 %
TOTAL	**R10 457**	**100%**	**R2 857**	**100%**
Economic Sector	**South Africa**		**North West Province**	
	GDP in current prices (R'm)	% of GDP	GDP in current prices (R'm)	% of GDP
Agriculture	R72 202	2.3%	R4 815	2.4%
Mining and quarrying	R282 366	9.2%	R61 478	30.8 %
Manufacturing	R349 066	11.3 %	R9 580	4.8%
Electricity, gas and water	R91 201	3.0%	R2 642	1.3%
Construction	R114 754	3.7%	R5 065	2.5%
Trade	R510 666	16.6 %	R24 937	12.5 %
Transport and communication	R272 303	8.8%	R15 383	7.7%
Finance and business services	R680 443	22.1 %	R30 209	15.1 %
Personal services	R182 795	5.9%	R16 588	8.3%
General government	R524 716	17.0 %	R28 855	14.5 %
TOTAL	**R3 080 513**	**100%**	**R199 551**	**100%**

(Quantec, 2014)

5.13.4 Labour Force and Employment Structure

Employment is the primary means by which individuals who are of working age may earn an income that will enable them to provide for their basic needs and improve their standard of living. As such, employment and unemployment rates are important indicators of socio-economic well-being.

Table 17: Labour force of the delineated study areas

	South Africa	North West Province	Dr. Ruth S. Mompati DM	Naledi LM	Vryburg
Working age population	33 928 806	2 273 362	271 161	42 774	13 809
Non-economically active population	13 238 633	907 948	132 786	16 198	4 911
Labour force	18 841 453	1 236 786	112 900	24 749	8 461
Employed	13 254 829	848 107	72 535	18 237	6 952
Unemployed	5 586 624	388 679	40 365	6 512	1 509
Unemployment rate	29.7%	31.4%	35.8%	26.3%	17.8%
Labour force participation rate	55.5%	54.4%	41.6%	57.9%	61.3%
Discouraged work seekers	5.4%	5.7%	9.4%	4.3%	3.2%

(Stats SA)

As stated previously, the proportion of the working age individuals in the LM and DM's respective total populations is relatively small when compared to the national average. It is estimated that 42 774 individuals in the Naledi LM are of working age (15 – 64 years of age). Proportionally, Vryburg has a bigger working age population, with 13 809 individuals out of 21 183 strong population being of working age.

Based on South Africa's official unemployment rate, only 17.8% of the labour force in Vryburg is unemployed. This is evidence of the comparatively good economic opportunities available in the town. An argument further strengthened by the fact that 64.6% of employment opportunities in the town are formal opportunities, compared to 56.7% and 57.4% in the DM and LM, respectively (Stats SA). In the Naledi LM the unemployment rate is higher (26.3%), but still lower than the national average of 29.7%. Unemployment in the province and DM is; however, much worse. In the province 31.4% of the labour force is unemployed, while more than a third (35.8%), of the labour force in the DM is unemployed. The fact that comparatively better economic opportunities are available in the LM is further reflected in the higher than average labour force participation rate of 61.3%. Furthermore, only 3.2% of the working age population is discouraged work seekers.

In the DM just about three quarters of all employment is created by the tertiary sector, with the community social and personal services sector, and the government sector generating 46% of the total employment creation in this economy. In the Naledi LM the portion of jobs created by the tertiary sector is even greater; here 78.5% of employment opportunities are generated by service industries (23.5% by the personal services sector, 20.4% by the trade sector, and 18.8% by the government sector). Other major employment creators in the LM are the construction industries (8.5%), and agriculture (7%) (Quantec, 2014).

5.13.5 Access to Housing and Basic Services

Access to shelter, water, electricity, sanitation, and other services are indicators that assist to determine the standard of living of the people in the area under investigation. Infrastructure and the state of the local infrastructure are other indicators to contemplate when considering living standards. The availability of social and economic infrastructure including roads, educational facilities, and health facilities, further indicates the nature of the study area that is valuable in developing a complete profile of the circumstances in which communities are living. These measurements create a baseline against which the potential impacts of the proposed project can be assessed.

- **Housing:** According to the 2011 National Census, 81.1% of households in Vryburg were living in formal brick structures. In the LM 82.8% live in formal structures, while proportionally even more households in the DM live in formal structures (85.7%). It follows that Vryburg has the highest number of households living in informal structures – 18.3% of households, compared to the 16.3% in the LM and 10.3% in the DM. In the DM, 3.3% of households reside on tribal land, while 1.3% of households in the LM are living on tribal land. In Vryburg this is considerably less, with 0.1% of households living on informal land.

  To address the housing backlog that is evident from the number of informal dwellings in Vryburg, the Naledi LM IDP contains the following housing projects with a total budget of R47.6 million:
  - Vryburg – Colride: Renovation of RDP stock.
  - Vryburg – Huhudi Southern Buffer: blocked project to be unblocked.
  - Vryburg Extension 25: Informal settlement upgrading.
  - Vryburg Extension 28: Informal settlement upgrading.
  - Rural housing – communal land rights applications across the LM.

- **Access to water**: The provision of piped water to households in the primary study area exceeds the provincial and national statistics significantly. In Vryburg 82% of households have access to piped water in their dwellings or inside their yards. A further 17.4% have to access piped water from a communal stand, while 0.2% of the households in Vryburg have no access to piped water. In the LM, slightly more households have to access piped water via a communal tap (20%), while 78% have access in their own home or yard. Furthermore, in the LM 2% of households have no access to piped water.

  The national statistics indicate that 73.4% of households have piped water in their yard or dwelling, while 8.8% have no access to piped water. Service delivery within the DM is below national levels. It is estimated that 47.9% of households access piped water inside their home or dwelling, while 47.7% have access from a communal stand. The proportion of the DM's population with no access to piped water is; however, still fewer than that of the country at 4.4%.

  According to the Naledi LM's IDP, the municipality is the water services provider and Sedibeng Water was appointed by the district as water services provider for Pudimoe, a settlement south of Vryburg. Huhudi (a settlement located between Pudimoe and Vryburg) needs approximately 2.5 mega litres (ml), per day and is dependent on Pudimoe for water. Currently Huhudi is receiving

between .75 and 1.2 ml of water, the town's water need is therefore not met. The plant at Pudimoe is refurbished and operational but the bulk water pipeline is still under construction.

The IDP acknowledges that more water points need to be made available in informal areas to improve access, and that the water meters at existing pumps require replacement. The municipality receives water from the Pudimoe purification plant and 18 boreholes. It is estimated that, depending on the hours pumping, the Pudimoe plant provides between 1 ml and 3 ml per day, with no bulk metering available to measure the yield of boreholes. As mentioned, the challenge is that the water supply is inadequate from the purification plant and boreholes. The LM hopes that refurbishment of the second Pudimoe purification plant and sinking of three additional boreholes will address this.

- **Access to sanitation**: If not managed and provided adequately, the basic need of sewerage and sanitation can pose serious health and safety risks to the communities not receiving these basic services. In Vryburg 82.7% of households had access to a flushing toilet, while 3.1% of the households had no access to toilet facilities. At the same time, 4.1% of the town's households were using pit latrines, while 9.4% were still reliant on the bucket system.

  The situation is markedly worse in the municipalities being studied. In the DM only 35% of households had access to a flushing toilet, while 11.2% of the households had no access. The bulk of the households (49.9%) in the DM was using pit latrine systems, with 0.9% of households using the bucket system. More households had access to a flushing toilet in the LM (69.2%); however, 4.5% of the Naledi LM's households were still using the bucket system. A situation that is in stark contrast to the government's determination to eradicate all bucket toilet systems by 2007. 11.8% Of households in the LM were using pit latrines, while 12.6% had no access to toilet facilities.

  As discussed, the Naledi LM IDP reveals that the municipality has been awarded as the water services provider. The following sanitation service provision challenges and backlogs are identified in the IDP:
    - A new waste water treatment plant is needed at Stella.
    - VIP toilets must be chemically treated to clean pits.
    - Additional Honey Sucker is needed to improve efficiency at Stella, Dithakwaneng, and Devondale.
    - Increased support from the DM is needed.
    - Stella requires a new oxidation pond, with the current oxidation pond not up to standard.
    - The bulk waste water treatment plant is under capacity, and the bulk sewer network has reached maximum capacity.
    - The town of Stella is not connected to the sewer network.

- **Access to electricity:** The indicator "electricity for lighting", was used as a proxy for measuring households' access to electricity. Nationally it is estimated that 84.8% of households have access to the grid for lighting. In the primary study area the percentage of households with access is less – 81.1% in Vryburg, 76.8% in the Naledi LM, and 82.3% in the Dr. Ruth S. Mompati DM.

The main alternative source for lighting in the study areas was candles; 17.7% of households in Vryburg used candles for lighting, while in the LM 21.3% relied on candles and 16% of households in the DM uses candles for lighting. In Vryburg 0.3% of households had no means of power to generate lighting, while 0.2% of households were using solar power for this purpose.

The Naledi LM IDP states that the electrical infrastructure in the LM is old and dilapidated. It goes on to state that the need exists for strengthening of the network and the creation of additional supply as the need for electricity increases in the LM. The in-migration in to LM further increases this need. Eskom is increasing supply to the LM as the system is already under pressure and a solar farm has been approved for Broedersput. The strategies identified by the LM in its IDP document to improve electricity supply include:

- Supply electricity from the southern side of Vryburg in order to reduce the pressure on the main substation at the industrial area.
- Develop the second feeder line to assist the Delarey feeder line of Eskom.
- Strengthening the feeder line feeding Stella substation.
- Upgrade the internal bulk network and distribution lines.
- The introduction of energy saving appliances.
- The introduction of rebates on all housing plans with “more natural” lighting options.

- **Refuse removal service**: It is estimated that 62% of households nationally have their refuse removed by a local authority on a weekly basis. In Vryburg the number of households with access to this service is substantially more (89.6%), while in the Naledi LM 66.4% of households have access to weekly refuse removal by a local authority. In the DM the main method of garbage disposal is an own refuse dump; 60.7% of households rely on this method, while only 27% has access to weekly garbage collection by a local authority.

  The Naledi LM’s IDP highlights the following service delivery constraints/problems related to adequate refuse disposal in the LM:

  - No access to waste and refuse disposal at Dithakwaneng and Devondale.
  - No licensed landfill site at Stella.
  - Illegal dumping.
  - Insufficient number of refuse bins in Naledi.
  - Insufficient number of transfer stations.
  - Unreliable transport for refuse removal.
  - Mass containers are not being maintained

- **Internet access**: Internet access has become increasingly important in accessing economic opportunities. Although not a definitive measure, it could be argued that a lack of access to the knowledge readily available on the internet could negatively affect an individual’s ability to access quality educational and economic opportunities.

  It is estimated that 64.5% of all South African households have no access to internet services. In Vryburg just more than half (55%), of households have no access. This effectively excludes 55% of households form the economic and social opportunities that could be accessed via the internet.

In the LM and DM the rate of exclusion is even higher, with 67.1% and 79.4% of the respective populations not having access. For those with access, a cell phone is the most common method of access, followed by home internet access or access at work.

5.13.6 Social and Recreational Infrastructure

The Naledi LM's IDP (2012 – 2017) contains information on the social and recreation infrastructure available in the LM. The IDP furthermore, provides a brief description of the general state of the infrastructure available. This section will summarise these findings.

According to the IDP, health facilities in the LM are situated in close proximity to the communities they are intended for and are easily accessible. The communities are using private vehicles and taxis to access these facilities and no need for government transport exists. **Table 18** provides information on the health facilities available in the Naledi LM. The only hospital in the LM is located in Vryburg. The town's population also has access to a mobile clinic and a community health centre. The IDP furthermore, suggests that there is a lack of HIV counselling facilities in the LM.

Table 18: Health facilities in the Naledi LM

	Hospital	Clinic	Mobile Clinic	Community health centre
Vryburg	1	-	1	1
Colridge	-	1	-	-
Huhudi	-	1	-	-
Stella	-	-	-	1

(Naledi Local Municipality, 2013)

The sport facilities available in the LM are depicted in **Table 19**. The municipalities realise the importance of the availability of these facilities in youth development, stating that measures should be implemented to increase the use of these facilities by the youth of the LM. It is evident from the data presented here that the LM is in need of rugby fields to ensure that grassroots development of the sport can take place here if the potential exists.

Table 19: Sport and recreational facilities in the Naledi LM

	Municipal swimming pool	Netball court	Soccer field	Tennis court	Rugby field	Gymnasium
Vryburg	1	3	2	1	-	1
Huhudi	1	-	1	-	-	-
Colridge	1	-	1	1	-	-
Kismet	-	-	1	1	-	-

(Naledi Local Municipality, 2013)

Also identified within the IDP are five cemeteries, four formal and one informal burial yard exists within the Naledi LM. Cemeteries play a vital cultural role in any community, and it is therefore, important to ensure that adequate provision is made for the communities' needs in this regard.

6 ENVIRONMENTAL ISSUES, POTENTIAL AND CUMULATIVE IMPACTS

6.1 Identification of Potential Impacts

The proposed development is likely to result in a variety of positive and negative impacts. Moreover, the proposed development could potentially result in collective and long term impacts more commonly known as cumulative impacts. A cumulative impact is the impact of an activity that, in itself, may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

The Scoping report assists in the identification of these potential and cumulative impacts, which will then be assessed at a more detailed level during the EIA stage.

Moreover, further details associated with the construction and operation of the various activities (as listed in the Project Description) in light of the above types of impacts that become available later in the EIA process will be discussed in detail in the EIA Phase.

The impacts that have been identified as being potentially significant are elaborated on in the sub-sections below.

6.1.1 Biodiversity Impacts

The following potential impacts have been identified for the proposed solar energy facility development and will be further investigated in the EIA phase of the biodiversity assessment.

Table 20: Impacts on indigenous natural vegetation

ISSUE	Impacts on indigenous natural vegetation
DISCUSSION	Losses would be suffered where areas need to be cleared of natural vegetation.
EXISTING IMPACT	Limited loss of natural vegetation in the study area and beyond and limited degradation of vegetation.
PREDICTED IMPACT	Moderate as some natural vegetation will be lost and the loss will be permanent.
EIA INVESTIGATION REQUIRED	Yes (a formal impact assessment is required)
CUMULATIVE EFFECT	Predicted to be low to moderate as there is some loss of habitat in the surrounding areas.

Table 21: Impacts on listed plant species

ISSUE	Impacts on listed plant species
DISCUSSION	There are two listed plant species that could potentially occur on site.

ISSUE	Impacts on listed plant species
EXISTING IMPACT	None known.
PREDICTED IMPACT	Moderate to Low as natural vegetation will be lost, but not sure whether species occur on site or not.
EIA INVESTIGATION REQUIRED	Yes (field investigation required to determine whether plant species occurs on site or not)
CUMULATIVE EFFECT	Populations of species of concern, if they occur on site, will probably not be affected or can be avoided.

Table 22: Impacts on protected plant species

ISSUE	Impacts on protected plant species
DISCUSSION	There is one protected plant species that could potentially occur on site.
EXISTING IMPACT	None known on site.
PREDICTED IMPACT	Moderate to Low as natural vegetation will be lost, but not sure whether species occur on site or not.
EIA INVESTIGATION REQUIRED	Yes (field investigation required to determine whether nationally protected plant species occurs on site or not).
CUMULATIVE EFFECT	Populations of protected species may have already been affected by nearby agricultural activities, but this is impossible to determine.

Table 23: Loss of individuals of protected trees

ISSUE	Loss of individuals of protected trees
DISCUSSION	There are two protected tree species that could occur on site, but it is unknown whether they occur there or not.
EXISTING IMPACT	None known.
PREDICTED IMPACT	Moderate to Low due to fact that low numbers probably occur on site.
EIA INVESTIGATION REQUIRED	Yes (field investigation required to determine whether species occurs on site or not)
CUMULATIVE EFFECT	Predicted to be low due to low number of individuals likely to be affected.

Table 24: Impacts on pan depressions

ISSUE	Impacts on pan depressions
DISCUSSION	Losses would be suffered where areas need to be cleared of natural vegetation.
EXISTING IMPACT	Limited loss of natural habitat in the study area and beyond and limited degradation of pans due to domestic livestock.
PREDICTED IMPACT	Moderate as some habitat will be lost and the loss will be permanent.
EIA INVESTIGATION REQUIRED	Yes (a formal impact assessment is required)
CUMULATIVE EFFECT	Predicted to be moderate as there is probably some degradation of habitat in surrounding areas.

Table 25: Impacts on sedentary fauna

ISSUE	Impacts on sedentary fauna
DISCUSSION	For species resident on site, loss of habitat would lead to local extinction of populations currently on site. For all other species listed, the loss of habitat would be unlikely to have any significant effect, since the species are mobile and would utilize other adjacent habitat.
EXISTING IMPACT	Limited loss of natural habitat in the study area and beyond.
PREDICTED IMPACT	Moderate as some habitat will be lost and the loss will be permanent.
EIA INVESTIGATION REQUIRED	Yes (presence or potential presence of two species vulnerable to the impact, Southern African Hedgehog and the Giant Bullfrog, needs to be established)
CUMULATIVE EFFECT	Predicted to be low because there is adequate habitat in surrounding areas to support displaced populations.

Table 26: Impact of displacement of mobile fauna

ISSUE	Displacement of mobile fauna
DISCUSSION	Fauna may be displaced due to noise and habitat disturbances on site, as well as general activities on site.
EXISTING IMPACT	None known
PREDICTED IMPACT	Low as some individuals may be locally displaced, but it is unlikely to have any significant effect on any of the listed species.
EIA INVESTIGATION REQUIRED	No
CUMULATIVE EFFECT	Predicted to be low as populations will return to surrounding habitats after construction activities have been completed.

Table 27: Impact summary table for the mortality of birds by collision with power lines

ISSUE	Mortality of birds by collision with power lines
DISCUSSION	Vertical infrastructure may affect flying animals due to collisions. Some Red List species may be especially vulnerable to this impact.
EXISTING IMPACT	There are existing power lines in the study area, all of significantly greater length than the proposed power lines.
PREDICTED IMPACT	Low as most species will avoid vertical infrastructure.
EIA INVESTIGATION REQUIRED	Yes (presence of species vulnerable to the impact to be determined in the field)
CUMULATIVE EFFECT	Predicted to be low due to the existing presence of power lines that are of far greater length than the proposed power lines.

Table 28: Impact summary table for the establishment and spread of declared weeds

ISSUE	Establishment and spread of declared weeds
DISCUSSION	There is a moderate possibility that alien plants could be introduced to areas within the footprint of the proposed infrastructure from surrounding areas in the absence of control measures.

ISSUE	Establishment and spread of declared weeds
EXISTING IMPACT	Unknown to what extent alien invasive species currently occur on site, but existing transformation and disturbance on site has probably created conditions slightly favourable for these species.
PREDICTED IMPACT	Moderate due to increased disturbance associated with construction activities, especially due to vegetation clearing. Impact can be easily managed with control measures.
EIA INVESTIGATION REQUIRED	Yes (presence of alien plants on site and in surrounding areas to be investigated)
CUMULATIVE EFFECT	Predicted to be low due to existing impacts on site and high ability to control any additional impact.

6.1.2 Avifauna Impacts

The following potential impacts have been identified for the proposed solar energy facility development and will be further investigated in the EIA phase of the avifaunal assessment.

Table 29: Impacts associated with mortality of priority species due to collisions with the PV panels.

ISSUE	Mortality of priority species due to collisions with the PV panels.
DISCUSSION	A total of 40 priority species could potentially be susceptible to this impact.
EXISTING IMPACT	Given the extensive farming practices which are currently used in the region, it can be surmised that the existing anthropogenic impacts on priority species are low.
PREDICTED IMPACT	Minor negative, but could be moderate negative if mortality levels of priority species turn out to be high.
EIA INVESTIGATION REQUIRED	Yes
CUMULATIVE EFFECT	Moderate to Low

Table 30: Impacts associated with the displacement of priority species due to habitat transformation and disturbance.

ISSUE	Displacement of priority species due to habitat transformation and disturbance.
DISCUSSION	A total of 39 priority species could potentially be susceptible to this impact.
EXISTING IMPACT	Given the extensive farming practices which are currently used in the region, it can be surmised that the existing anthropogenic impacts on avifauna are low.
PREDICTED IMPACT	Moderate negative.
EIA INVESTIGATION REQUIRED	Yes
CUMULATIVE EFFECT	High at a local level and moderate to low within a regional level.

Table 31: Impacts associated with the disturbance of breeding raptors on the existing high voltage lines.

ISSUE	Disturbance of breeding raptors and roosting vultures on the existing high voltage lines.
DISCUSSION	Two priority species, Martial Eagle and Cape Vulture, could potentially be susceptible to this impact.
EXISTING IMPACT	It is unknown how many raptors are breeding on the existing high voltage lines in the study area, but if there are any, it is likely that they are not regularly disturbed, given the remoteness of the area.
PREDICTED IMPACT	Moderate to low, depending on the number of species and the number of nests.
EIA INVESTIGATION REQUIRED	Yes
CUMULATIVE EFFECT	Moderate to low at a regional level, depending on the number of species and the number of nests. Should a breeding pair of Martial Eagles be affected, the impact could be high at a local level.

6.1.3 Surface Water Impacts

The following potential impacts have been identified for the proposed solar power facility development and will be further investigated in the EIA phase of the surface water assessment.

Table 32: Impacts associated with the construction lay-down area directly in the surface water resource(s)

ISSUE	Where the placement of the construction lay-down area for the proposed development of the PV facilities extends into surface water resources, the excavation of potential wetland/watercourse soils and vegetation clearance could potentially result.
DISCUSSION	No existing impacts are present in terms of construction lay-down areas.
EXISTING IMPACT	Low predicted impact due to the high degree of available land to place the construction lay-down area outside of any sensitive surface water resources. If the construction lay-down area will be placed within close proximity to surface water resources, a moderate impact is predicted due to the instability of wetland and any other surface water resource soils making site locations in these sensitive areas unlikely.
PREDICTED IMPACT	Yes
EIA INVESTIGATION REQUIRED	Moderate predicted cumulative effect given that the size of the construction lay-down area may be significant and might need to be placed partially in or near the surface water resources to where construction areas are located.
CUMULATIVE EFFECT	Where the placement of the construction lay-down area for the proposed development of the PV facilities extends into surface water resources,

ISSUE	Where the placement of the construction lay-down area for the proposed development of the PV facilities extends into surface water resources, the excavation of potential wetland/watercourse soils and vegetation clearance could potentially result.
	the excavation of potential wetland/watercourse soils and vegetation clearance could potentially result.

Table 33: Impacts associated with establishing the foundations of the proposed development

ISSUE	Impacts associated with establishing the foundations of the proposed PV facilities
DISCUSSION	Where the placement of the foundations of the proposed PV facilities extend into the surface water resource areas, the excavation of potential hydric soils are likely to be affected.
EXISTING IMPACT	A moderate impact is predicted as a few structures/buildings have been identified within close proximity to certain potential surface water resources.
PREDICTED IMPACT	Moderate to high impact is predicted due to the instability of hydric soils. It is likely that the foundations of the various buildings and structures may need to be placed in the surface water resource area or within close proximity.
EIA INVESTIGATION REQUIRED	Yes.
CUMULATIVE EFFECT	Moderate to high predicted cumulative effect given the various PV panels, buildings and structures that might need to be placed in or near the surface water resource areas.

Table 34: Impacts associated with the clearing of vegetation for proposed development

ISSUE	Impacts associated with the clearing of vegetation for proposed development of the PV facilities
DISCUSSION	Vegetation within the proposed development site will have to be removed for the construction phase to take place.
EXISTING IMPACT	Minor current impacts present. Minor clearing of vegetation has taken place for the dirt roads and two (2) structures present within the study area.
PREDICTED IMPACT	Moderate to high predicted impact due to the need for vegetation to be removed from within surface water resources.
EIA INVESTIGATION REQUIRED	Yes.
CUMULATIVE EFFECT	Moderate to high predicted cumulative effect given that the greater proposed development is expected to occupy an area of approximately 1700 hectares. The buildable area is, however, expected to be significantly smaller than this and will be determined by sensitive areas identified during the Scoping Phase of the EIA. The cumulative effect could therefore

ISSUE	Impacts associated with the clearing of vegetation for proposed development of the PV facilities
	increase or decrease, depending on the size of the study area which will be occupied or cleared and the presence of sensitive areas.

Table 35: Impacts associated with abnormal/heavy vehicle access into surface water resources

ISSUE	Impacts associated with abnormal/heavy vehicle access into surface water resources
DISCUSSION	During the construction phase, vehicles of variable size will need to access the site. Such vehicles may include conventional construction vehicles in addition to abnormal heavy vehicles that will need to transport the component parts of the PV facilities. Where these vehicles need to cross surface water resources, degradation can be caused to these sensitive environments.
EXISTING IMPACT	Minor impacts associated with a few access roads currently passing within close proximity to surface water areas evident from a desktop level.
PREDICTED IMPACT	Minor to moderate predicted impact due to the need for the various components to reach all areas of the study site in order to transport materials required for the construction of the PV facilities.
EIA INVESTIGATION REQUIRED	Yes.
CUMULATIVE EFFECT	Minor to moderate predicted cumulative effect as several dirt roads were found to pass within close proximity to potential surface water resources. Newly constructed access and internal roads which need to cross any surface water resource areas will therefore add to this existing impact.

Table 36: Impacts associated with general access near or in surface water resource area

ISSUE	Impacts associated with general access near or in surface water resource area
DISCUSSION	General access into surface water resource areas refers to activities such as physical destruction caused by humans, excavation and degradation of surface water resources by construction machinery, use of surface water resources for sanitary facilities, dumping of materials, waste and litter. This specifically relates to any construction areas that take place near surface water resources.
EXISTING IMPACT	From a desktop level, a minor impact is present as two (2) existing structures were found to be in close proximity to potential identified wetland areas.
PREDICTED IMPACT	Minor to moderate predicted impact due to the need for construction activities to take place in most areas of the study site.
EIA INVESTIGATION REQUIRED	Yes.

ISSUE	Impacts associated with general access near or in surface water resource area
CUMULATIVE EFFECT	Minor to moderate predicted cumulative effect as two (2) existing structures were found to be in close proximity to potential identified wetland areas. These existing impacts, in combination with the potential impacts associated with general access near or in surface water resource areas, are expected to add to the cumulative effect.

Table 37: Impacts associated with improper stormwater management effects on nearby surface water resources

ISSUE	Impacts associated with improper stormwater management effects on nearby surface water resources
DISCUSSION	Where the location of the PV panels, buildings, internal roads, access roads, car park, the switching station and the construction lay-down area are to be situated near surface water resources, increased run-off caused by rainfall events can produce potential erosion and sedimentation impacts to nearby surface water resources.
EXISTING IMPACT	From a desktop level, slight signs of erosion are present around two (2) structures that have been identified in the study area.
PREDICTED IMPACT	Moderate predicted impact due to the likelihood of this impact occurring.
EIA INVESTIGATION REQUIRED	Yes.
CUMULATIVE EFFECT	Moderate predicted cumulative effect due to the presence of slight signs of erosion in the study area as well as the likelihood of this impact occurring as a result of the construction of the PV facilities.

Table 38: Impacts associated with the oil, fuels and other soluble substances from construction activities, vehicles and machinery into nearby surface water resources

ISSUE	Impacts associated with the oil, fuels and other soluble substances from construction activities, vehicles and machinery into nearby surface water resources
DISCUSSION	Construction activities make use of fuels, oils, and other soluble substances (cement mix). These pose a pollution risk to nearby surface water resources where spillage or leakage occurs.
EXISTING IMPACT	From a desktop level no such pollution impacts could be identified.
PREDICTED IMPACT	Minor to moderate predicted impact due to the likelihood of this impact occurring.
EIA INVESTIGATION REQUIRED	Yes.
CUMULATIVE EFFECT	Moderate to high predicted cumulative effect.

Table 39: Impacts associated with the 132kV power line installation into/over nearby surface water resources

ISSUE	Impacts associated with the 132kV power line installation into/over nearby surface water resources
DISCUSSION	It is anticipated that the 132kV power lines will relay the generated energy to the switching station and subsequently to the power grid. It is also envisaged that the overhead power lines and underground cables may need to cross through surface water resources where absolutely necessary.
EXISTING IMPACT	From a desktop level, no power line impacts could be identified directly on the study site.
PREDICTED IMPACT	Minor to moderate predicted impact due to the likelihood of this impact occurring.
EIA INVESTIGATION REQUIRED	Yes.
CUMULATIVE EFFECT	Moderate to high predicted cumulative effect.

Table 40: Impacts associated with service roads through surface water resources

ISSUE	Impacts associated with service roads through surface water resources
DISCUSSION	Service roads for linear infrastructure will be required, and may require crossing identified surface water resources.
EXISTING IMPACT	Minor to moderate current impact present as several access roads pass within close proximity of identified potential wetland areas.
PREDICTED IMPACT	Moderate to high predicted impact due to the likelihood of this impact occurring, the permanent nature of the infrastructure required and lastly, the fact that there are several existing access roads located near potential surface water resources identified at a desktop level.
EIA INVESTIGATION REQUIRED	Yes.
CUMULATIVE EFFECT	Moderate predicted cumulative effect due to the fact that several existing access roads which are located near potential wetland areas have been identified. The establishment of new/additional roads will therefore add to this impact.

Table 41: Stormwater run-off associated with PV energy facility, substation and associated infrastructure

ISSUE	Stormwater run-off associated with PV energy facility, substation and associated infrastructure
DISCUSSION	The impact of stormwater run-off is primarily related to the types of structures and surfaces that will need to be established for the proposed PV facilities. Hard impermeable surfaces and foundations are to be laid over the extent of the proposed development. Flat and hard surfaces aid

ISSUE	Stormwater run-off associated with PV energy facility, substation and associated infrastructure
	with the acceleration and generation of run-off which can impact on nearby wetlands through the onset of erosion at the interface between the proposed development and the surface water resources.
EXISTING IMPACT	From a desktop level, slight signs of erosion are present around two (2) structures that have been identified in the study area.
PREDICTED IMPACT	Moderate predicted impact due to the likelihood of this impact occurring.
EIA INVESTIGATION REQUIRED	Yes.
CUMULATIVE EFFECT	Moderate to high predicted cumulative effect.

Table 42: Oil leakages from switching stations

ISSUE	Oil leakages from switching stations
DISCUSSION	The main potential impact that may result from the operation phase of the switching station is the potential spillage of oil from the transducers that are to be housed. If oil were to spill from the switching station, it could be transported via storm water run-off into the adjacent surface water resources, thereby polluting not only the water but the soils as well causing possible groundwater and soil contamination.
EXISTING IMPACT	Pollution impacts were not identifiable from a desktop level.
PREDICTED IMPACT	Minor predicted impact due to the likelihood of this impact occurring.
EIA INVESTIGATION REQUIRED	Yes.
CUMULATIVE EFFECT	Minor to moderate predicted cumulative effect.

6.1.4 Soils and Agricultural Potential Impacts

The following potential impacts have been identified for the proposed solar power facility development and will be further investigated in the EIA phase of the soils and agricultural potential assessment.

Table 43: Summary of potential impacts from the Solar PV Energy Facility

ISSUE	Loss of agricultural potential
DISCUSSION	Soil would be impacted by the establishment of infrastructure.
EXISTING IMPACT	Only extensive grazing practiced at present.
PREDICTED IMPACT	Low, as soils are shallow and climate unfavourable for cultivation.
EIA INVESTIGATION REQUIRED	No

CUMULATIVE EFFECT	Predicted to be low as the loss of soil will not be significant once the infrastructure is in place and post-project rehabilitation should be possible.

6.1.5 Visual Impacts

The following potential impacts have been identified for the proposed solar power facility development and will be further investigated in the EIA phase of the visual assessment.

Table 44: Visual Impact Summary

ISSUE	**Visual Impact of the proposed solar PV energy facility**
DISCUSSION	Solar energy facilities have an extensive spatial coverage and can be visually intrusive especially when located in untransformed natural settings. Much of the surrounding area has a natural rural visual character due to the uninhabited nature of the area. However, several solar energy facilities are proposed within relatively close proximity to the proposed development. These facilities and their associated infrastructure, typically consist of very large structures which are highly visible. As such, these facilities will significantly alter the visual character and baseline in the study area if constructed and make it appear to have a more industrial-type visual character. Twenty-three (23) potentially sensitive receptors were identified within 5km from the proposed PV development area.
EXISTING IMPACT	There is a relatively low level of existing visual impact within the surrounding landscape. The most visually prominent visual impacts or degrading features include; the N18 national route, a high voltage 400kV power line that traverses the site, Mookodi Substation and other linear elements, such as a railway line, gravel access roads, telephone poles, communication poles and farm boundary fences.).
PREDICTED IMPACT	▪ The natural visual character of the surrounding area could be altered. ▪ The facility would likely be highly visible for great distances, thus altering the relatively untransformed rural sense of place within the surrounding area. ▪ The proposed development could adversely affect farmsteads / homesteads within the visual assessment zone, motorists travelling along the N18 and visitors at the Arthington Memorial Church or Tiger Kloof Educational Institution. ▪ Vehicles and trucks travelling to and from the proposed site would increase dust emissions during both the construction and operational

	phases. The dust plumes could create a visual impact and may evoke negative sentiments from surrounding viewers. ▪ Surface disturbance during construction would expose bare soil which could visually contrast with the surrounding environment. In addition, temporarily stockpiling of soil during construction may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact. ▪ Security and operational lighting at the PV energy facility could result in light pollution and glare, which could be an annoyance to surrounding viewers. ▪ Potential visual impacts as a result of the infrastructure associated with the proposed PV energy facility.
EIA INVESTIGATION REQUIRED	Yes
CUMULATIVE EFFECT	Several solar energy facilities are proposed within relatively close proximity to the proposed PV energy facility. These pending developments and their potential for large scale visual impacts could significantly alter the sense of place and visual character in the study area, if constructed.

6.1.6 Heritage Impacts

The following potential impacts have been identified for the proposed solar energy facility development and will be further investigated in the EIA phase of the heritage assessment.

Table 45: Impact on archaeological sites.

ISSUE	Impact on archaeological sites
DISCUSSION	No indication of archaeological finds have been found during the desktop assessment. However this cannot exclude the possibility of archaeological finds .
EXISTING IMPACT	None known
PREDICTED IMPACT	Unidentified archaeological sites and the discovery of such sites during construction can seriously hamper construction timelines. Fieldwork can thus provide valuable information on such site in the study area and provide timeous management of such site through realignment of development or mitigation of such sites where needed.
EIA INVESTIGATION REQUIRED	Archaeological walk down of impact areas
CUMULATIVE EFFECT	None foreseen at this stage.

Table 46: Impact on palaeontological sites.

ISSUE	Impact on palaeontological sites
DISCUSSION	The palaeontological potential of the area has been confirmed as being moderate by the palaeontological desktop assessment
EXISTING IMPACT	Site impacted by existing developments such as transmission lines and road networks.
PREDICTED IMPACT	Due to the known occurrence of stromatolites within the dolomite of the Monte Christo Formation, as well as the possibility of Cave Breccias being present, a Moderate Palaeontological sensitivity rating is given to the study area.
EIA INVESTIGATION REQUIRED	Full Palaeontological Impact Assessment is required.
CUMULATIVE EFFECT	None foreseen at this stage.

Table **47:** Impact on historical sites.

ISSUE	Impact on historical sites
DISCUSSION	The archival research has shown that the historical activities in the area was wide spread during the South African War as well as the diamond rush of the1920's. The position of Bakerville just 10 km to the north, show the possibility of finding historical remains within the study area.
EXISTING IMPACT	None known
PREDICTED IMPACT	Unidentified historical structure and the discovery of such structures during construction can seriously hamper construction timelines. Fieldwork can thus provide valuable information on such site in the study area and provide timeous management of such site through realignment of development or mitigation of such sites where needed.
EIA INVESTIGATION REQUIRED	Archaeological walk down of impact areas will identify possible impacted sites
CUMULATIVE EFFECT	None foreseen at this stage.

6.1.7 Socio-economic Impacts

The following potential impacts have been identified for the proposed solar PV facility and will be further investigated in the EIA phase of the socio-economic assessment.

Table 48: Impact of the increase in production and GDP-R of the national and local economies due to project capital expenditure

ISSUE	Increase in production and GDP-R of the national and local economies due to project capital expenditure
DISCUSSION	The impact takes place due to the investment on the project that will be spent in the country. Besides the direct impact, it involves the indirect and

	induced effects that are created when either suppliers of goods and services to the project experience an increase in demand, or when businesses servicing households experience an increase in demand for their products.
EXISTING IMPACT	The local economy has a relatively undiversified economy, with emphasis on the services sector. The agriculture sector, albeit small in the LM, is an important sector in Vryburg.
PREDICTED IMPACT	High Positive
EIA INVESTIGATION REQUIRED	Yes
CUMULATIVE EFFECT	Could be high considering the potential for solar projects in the DM and the North West Province in general.

Table 49: Impact of the creation of temporary employment in the local communities and elsewhere in the country

ISSUE	Creation of temporary employment in the local communities and elsewhere in the country
DISCUSSION	The impact is generated through capital expenditure that shocks the economy. It involves the creation of direct new job opportunities related to the construction of the proposed solar PV, and employment opportunities that will be indirectly created through the increased expenditure in sectors supplying goods and services to the construction activity and in sectors benefiting from the increase of consumer expenditure.
EXISTING IMPACT	The local and national economies have high unemployment rates, and government set a target to create 11 million jobs by 2030. The Naledi LM, and Vryburg in particular, offers better economic opportunities than the national average.
PREDICTED IMPACT	Moderate Positive
EIA INVESTIGATION REQUIRED	Yes
CUMULATIVE EFFECT	Could be high considering the potential for solar projects in the DM and the North West Province in general.

Table 50: Impact of skills development due to the creation of new employment opportunities

ISSUE	Skills development due to the creation of new employment opportunities
DISCUSSION	The impact takes place during construction and will last beneficiaries for an entire lifetime.
EXISTING IMPACT	Literacy levels in Vryburg are above the national average; in the Naledi LM the situation is worse, with a limited skills base.
PREDICTED IMPACT	Moderate Positive
EIA INVESTIGATION REQUIRED	Yes

CUMULATIVE EFFECT	Could be high considering the potential for solar projects in the DM and the North West Province in general.

Table 51: Impact of improved standard of living of households directly or indirectly benefiting from created employment opportunities

ISSUE	Improved standard of living of households directly or indirectly benefiting from created employment opportunities
DISCUSSION	The impact takes place during construction as a result of jobs created through direct, indirect, and induced impacts.
EXISTING IMPACT	The households in the local municipality are, on average, worse off than in the country in general. Households in Vryburg are significantly better off though.
PREDICTED IMPACT	Moderate Positive
EIA INVESTIGATION REQUIRED	Yes
CUMULATIVE EFFECT	Could be high considering the potential for solar projects in the DM and the North West Province in general.

Table 52: Impact of the increase in government revenue due to investment

ISSUE	Increase in government revenue due to investment
DISCUSSION	The impact will take place as a result of domestic spending on construction activities, and will be acquired by government through indirect and direct taxes on the project's activity.
EXISTING IMPACT	Due to a limited economic base and low income levels, the local municipality's revenue base is limited, which in turn negatively impacts on its ability to provide services to its residents.
PREDICTED IMPACT	Moderate Positive
EIA INVESTIGATION REQUIRED	Yes
CUMULATIVE EFFECT	Could be high considering the potential for solar projects in the DM and the North West Province in general.

Table 53: Impact of the potential sterilisation of agricultural land

ISSUE	Potential sterilisation of agricultural land
DISCUSSION	The footprint of the proposed project will sterilise the land from potential use for agricultural activities
EXISTING IMPACT	Cattle and game breeding activities are taking place on Farm Edinburgh. From initial interaction with the land owner, it was revealed that it is unlikely that these activities will be interrupted by the proposed project.
PREDICTED IMPACT	Low Negative

EIA INVESTIGATION REQUIRED	Yes
CUMULATIVE EFFECT	Vryburg is the biggest beef producer in South Africa and host to the country's third biggest agricultural show. Continued sterilisation of agricultural land could lead to this position, and the related economic stimulation, being lost.

Table 54: Impact of a negative financial and social impact associated with the relocation of affected households

ISSUE	Negative financial and social impact associated with the relocation of affected households
DISCUSSION	The construction of the PV energy facility and associated infrastructure, may result in affected households having to relocate, which is associated with negative financial and social implications.
EXISTING IMPACT	A homestead is located on the farm, relocation is unlikely due to the project being situated on a 200 ha plot, away from the homestead.
PREDICTED IMPACT	Low Negative
EIA INVESTIGATION REQUIRED	Yes
CUMULATIVE EFFECT	Could be high considering the potential for solar projects in the DM and the North West Province in general.

Table 55: Impact of a change in demographics of the area due to influx of workers and job seekers

ISSUE	Change in demographics of the area due to influx of workers and job seekers
DISCUSSION	The construction activities will attract job seekers and will involve the migration of construction workers to the site.
EXISTING IMPACT	The local area is not sufficiently diversified to provide all skills necessary during construction.
PREDICTED IMPACT	Moderate Negative
EIA INVESTIGATION REQUIRED	Yes
CUMULATIVE EFFECT	Could be high considering the potential for solar projects in the DM and the North West Province in general.

Table 56: Impact of an increase in social pathologies associated with influx of migrant labourers and job seekers to the area (health, crime, prostitution, xenophobia, etc.)

ISSUE	Increase in social pathologies associated with influx of migrant labourers and job seekers to the area (health, crime, prostitution, xenophobia, etc.)
DISCUSSION	The construction activities may attract job seekers and may involve the migration of construction workers to the site. The increase in the number of job seekers and migrants in the municipality could cause an increase in social pathologies.

ISSUE	Increase in social pathologies associated with influx of migrant labourers and job seekers to the area (health, crime, prostitution, xenophobia, etc.)
EXISTING IMPACT	The local area is not sufficiently diversified to provide all skills and workers necessary during construction.
PREDICTED IMPACT	Moderate Negative
EIA INVESTIGATION REQUIRED	Yes
CUMULATIVE EFFECT	Could be high considering the potential for solar projects in the DM and the North West Province in general.

Table 57: Impact of added pressure on basic services and social and economic infrastructure

ISSUE	Added pressure on basic services and social and economic infrastructure
DISCUSSION	If the project attracts a great number of workers and job seekers, this could put further pressure on the LM, as it will increase the demand for basic services, and social and economic infrastructure.
EXISTING IMPACT	Overall, service delivery in Vryburg is better than in the LM and the DM. Provision of adequate housing is below par, however.
PREDICTED IMPACT	Low Negative
EIA INVESTIGATION REQUIRED	Yes
CUMULATIVE EFFECT	Could be high considering the potential for solar projects in the DM and the North West Province in general.

Table 58: Impact of the increase in generation capacity in the province as well as the advancement of the RE sector in achieving long term, sustainable supply

ISSUE	Increase in generation capacity in the province as well as the advancement of the RE sector in achieving long term, sustainable supply
DISCUSSION	The impact will take place as a result of the PV energy facility being established and becoming operational.
EXISTING IMPACT	The Province is the fourth biggest electricity user in the country and relies primarily on coal generated electricity. Informal and rural households with no electricity make use of wood or gas, adding to the province's harmful emissions.
PREDICTED IMPACT	High Positive
EIA INVESTIGATION REQUIRED	Yes
CUMULATIVE EFFECT	Could be high considering the potential for solar projects in the DM and the North West Province in general.

Table 59: Impact of the sustainable increase in production and GDP-R of the national and local economies through operation and maintenance activities

ISSUE	Sustainable increase in production and GDP-R of the national and local economies through operation and maintenance activities
DISCUSSION	The impact will take place as a result of operational expenditure on the solar PV farm, which will also create sustainable multiplier effects.
EXISTING IMPACT	The local economy has a large reliance on service industries, and the need to diversify the economy is dire.
PREDICTED IMPACT	Moderate to High Positive
EIA INVESTIGATION REQUIRED	Yes
CUMULATIVE EFFECT	Could be high considering the potential for solar projects in the DM and the North West Province in general.

Table 60: Impact of the creation of long-term employment in local and national economies through operation and maintenance activities

ISSUE	Creation of long-term employment in local and national economies through operation and maintenance activities
DISCUSSION	The impact will take place as a result of operational expenditure on the solar PV farm, which will also create sustainable multiplier effects
EXISTING IMPACT	The LM's economy has a moderate unemployment rate. This investment would create new sustainable opportunities.
PREDICTED IMPACT	Low to Moderate Positive
EIA INVESTIGATION REQUIRED	Yes
CUMULATIVE EFFECT	Could be high considering the potential for solar projects in the DM and the North West Province in general.

Table 61: Impact of skills development due to the creation of new sustainable employment opportunities

ISSUE	Skills development due to the creation of new sustainable employment opportunities
DISCUSSION	The impact takes place during operations of the solar PV farm and occurs due to on-job training.
EXISTING IMPACT	The local municipality has a very limited skills base and poor educational levels.
PREDICTED IMPACT	Low Positive
EIA INVESTIGATION REQUIRED	Yes
CUMULATIVE EFFECT	Could be high considering the potential for solar projects in the DM and the North West Province in general.

Table **62:** Impact of improved standard of living of households directly or indirectly benefiting from created employment opportunities

ISSUE	Improved standard of living of households directly or indirectly benefiting from created employment opportunities
DISCUSSION	The impact takes place as a result of jobs created through direct, indirect, and induced impacts
EXISTING IMPACT	The households in the local municipality are, on average, worse off than in the country in general; households in Vryburg fare considerably better, though.
PREDICTED IMPACT	Low to Moderate Positive
EIA INVESTIGATION REQUIRED	Yes
CUMULATIVE EFFECT	Could be high considering the potential for solar projects in the DM and the North West Province in general.

Table 63: Impact of an increase in government revenue stream

ISSUE	Increase in government revenue stream
DISCUSSION	The project, through its operations, will contribute to government revenue through payments of income taxes and payroll taxes.
EXISTING IMPACT	The local tax base is small, which limits the ability of the municipalities to provide quality services.
PREDICTED IMPACT	Moderate Positive
EIA INVESTIGATION REQUIRED	Yes
CUMULATIVE EFFECT	Could be high considering the potential for solar projects in the DM and the North West Province in general.

Table 64: Impact of investment in the local communities and economic development projects as part of a Social Economic Development and Enterprise Development plan

ISSUE	Investment in the local communities and economic development projects as part of a Social Economic Development and Enterprise Development plan
DISCUSSION	The project will form part of the Independent Power Producer Procurement Programme; that implies that the operating company allocates a certain percentage of the project's revenue towards community development.
EXISTING IMPACT	Compared to the LM, Vryburg has a community with better skills levels and more economic opportunities. Surrounding settlements would also benefit from the project.
PREDICTED IMPACT	Moderate to High Positive
EIA INVESTIGATION REQUIRED	Yes
CUMULATIVE EFFECT	Could be high considering the potential for solar projects in the DM and the North West Province in general.

Table 65: Impact of an altered sense of place

ISSUE	Altered sense of place
DISCUSSION	The project is expected to have a notable visual impact, which will alter the landscape and ultimately affect the sense of place developed by local residents and visitors.
EXISTING IMPACT	Initial interaction with the land owner revealed that the property is used for cattle farming and game breeding and has a homestead on the farm. Directly impacted sensitive receptors can thus be considered to be few.
PREDICTED IMPACT	Low Negative
EIA INVESTIGATION REQUIRED	Yes
CUMULATIVE EFFECT	Could be high considering the potential for solar projects in the DM and the North West Province in general.

Table 66: Impact on commercial property and land values in the surrounding area

ISSUE	Impact on commercial property and land values in the surrounding area
DISCUSSION	The development of the wind farm could lead to changes in the property values in the area, which could either be positive or negative. It could either increase the demand for properties in the area considering the accessibility to transmission infrastructure and resource potential, or reduce the property value due to the change in the sense of place.
EXISTING IMPACT	The site visit to be undertaken in the EIA phase will enable a clear land use profile for the surrounding properties.
PREDICTED IMPACT	Low Negative and/or Low Positive
EIA INVESTIGATION REQUIRED	Yes
CUMULATIVE EFFECT	Could be high considering the potential for solar projects in the DM and the North West Province in general, particularly if they are built in the vicinity or on route to the site.

6.2 Identification of Mitigation Measures

- Avoid patches of indigenous vegetation if possible, or place infrastructure as close as possible to boundaries.
- Vegetation clearing should take place in a phased manner, only clearing areas that will be constructed on immediately. Vegetation clearing must not take place in areas where construction will only take place in the distant future.
- Visibility devices could be placed on overhead power lines. This will reduce the probability of avifaunal collisions slightly.
- Construction activity should be restricted to the immediate footprint of the infrastructure.
- Avifaunal monitoring should take place before, during and after construction.

- The detailed protocol to be followed for the inspections will be compiled by the avifaunal specialist prior to the first inspection.
- An appropriate storm water management plan formulated by a suitably qualified professional must accompany the proposed development to deal with increased run-off in the designated construction areas.
- Avoid wetland systems, where possible, by spanning them completely.
- Any identified surface water resources and the associated buffer zones are to be designated as “highly sensitive areas”. No vehicles are to be allowed in the highly sensitive areas unless authorised.
- No water is to be extracted unless a water use license is granted for specific quantities for a specific water resource.
- No hazardous or building materials are to be stored or brought into the highly sensitive areas. Should a designated storage area be required, the storage area must be placed at the furthest location from the highly sensitive areas. Appropriate safety measures as stipulated above must be implemented.
- Carefully plan to reduce the construction period.
- Minimise vegetation clearing and rehabilitate cleared areas as soon as possible.
- Maintain a neat construction site by removing rubble and waste materials regularly.
- Make use of existing gravel access roads where possible.
- Ensure that dust suppression techniques are implemented on all access roads.
- In the event that a possible heritage find is discovered during construction, all activities must be halted in the area of the discovery and a qualified archaeologist contacted.
- If mitigation is necessary, an application for a rescue permit must be lodged with SAHRA.
- If during the initial survey sites of cultural significance are discovered, it will be necessary to develop a management plan for the preservation, documentation or destruction of such a site. Such a program must include an archaeological/palaeontological monitoring programme, timeframe and agreed upon schedule of actions between the company and the archaeologist.
- In the event that human remains are uncovered, or previously unknown graves are discovered, a qualified archaeologist needs to be contacted and an evaluation of the finds made. If the remains are to be exhumed and relocated, the relocation procedures as accepted by SAHRA need to be followed. This includes an extensive social consultation process.
- It is recommended that the project owner develops practical SED and ED programmes throughout the project’s lifespan. The plan should be developed in consultation with local authorities and existing strategy documents to identify community projects that would result in the greatest social benefits. With regard to ED initiatives, focus should be on developing plans to support and create sustainable, self-sufficient enterprises. It is important that these plans be reviewed annually and where possible updated.

Recommended mitigation measures will be refined after the detailed fieldwork has been completed.

7 LAYOUT ALTERNATIVES

One of the aims of the Scoping report is to identify alternatives to carry through to the EIA phase of the investigation for detailed assessment (as was discussed in Chapter 2). The selection of alternatives during the scoping phase of the project usually helps to focus future investigations, both in terms of the environmental investigations required and the scope of the public participation process.

7.1 Methodology for Assessing Layouts

Various specialists identified preliminary site specific sensitive areas during the scoping phase of the EIA that may need to be precluded from the buildable area. These include the avifaunal, heritage, palaeontological, biodiversity and surface water specialists. The sensitive areas identified by these specialists were used to guide the design of PV panel layouts, where practical. The identified sensitive areas were also used to assess the impacts of each of the proposed alternatives on the environment.

The Impact Assessment Methodology assists in evaluating the overall effect of a proposed activity on the environment. The determination of the effect of an environmental impact on an environmental parameter is determined through a systematic analysis of the various components of the impact. This is undertaken using information that is available to the environmental practitioner through the process of the environmental impact assessment. The impact evaluation of predicted impacts was undertaken through an assessment of the significance of the impacts.

7.1.1 Determination of Significance of Impacts

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e. site, local, national or global whereas Intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table 82.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

7.1.2 Impact Rating System

Impact assessment must take account of the nature, scale and duration of effects on the environment whether such effects are positive (beneficial) or negative (detrimental).

- Rating System Used To Classify Impacts

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the mitigation of the impact. Impacts have been consolidated into one rating. In assessing the significance of each issue the following criteria (including an allocated point system) is used:

Table 67: Description of terms

NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect the site
2	Local/district	Will affect the local area or district
3	Province/region	Will affect the entire province or region
4	International and National	Will affect the entire country
PROBABILITY		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.

4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
DURATION		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity		
1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts on the environmental parameter. A cumulative effect/impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible Cumulative Impact	The impact would result in negligible to no cumulative effects
2	Low Cumulative Impact	The impact would result in insignificant cumulative effects
3	Medium Cumulative impact	The impact would result in minor cumulative effects
4	High Cumulative Impact	The impact would result in significant cumulative effects

INTENSITY / MAGNITUDE		
Describes the severity of an impact		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
Significance		

SIGNIFICANCE

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

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

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

Points	Impact Significance Rating	Description
6 to 28	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive Low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.

29 to 50	Positive Medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive High impact	The anticipated impact will have significant positive effects.
74 to 96	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive Very high impact	The anticipated impact will have highly significant positive effects.

7.2 Layout Alternatives

Two alternative site locations for the substation were proposed, as well as two alternative locations for the laydown area and two alternative sites for the O&M buildings. Due to the limited space available within the development area, as well as the constraints of the sensitive areas, no alternative PV panel layouts were identified. It was felt that it would be environmentally preferable to assess one viable development area for the panel layout rather than two panel layouts that are not technically or environmentally viable. The route for the 132kV power line which will connect the onsite substation to the proposed 400kV Sendawo substation has not been identified during the scoping phase. The end point of the power line is dependent on the outcome of the Sendawo grid connection EIA, and the Sendawo 1 132kV power line alternatives will therefore be assessed during the EIA phase. The layout alternatives were selected based on a preliminary identification of sensitive areas. The Sendawo 1 layout alternatives are presented in **Figure 22**.

In order to provide a preliminary assessment of alternatives, the proposed layout alternatives were overlaid onto the sensitive areas identified by specialists, the combined map is shown below in **Figure 23**.

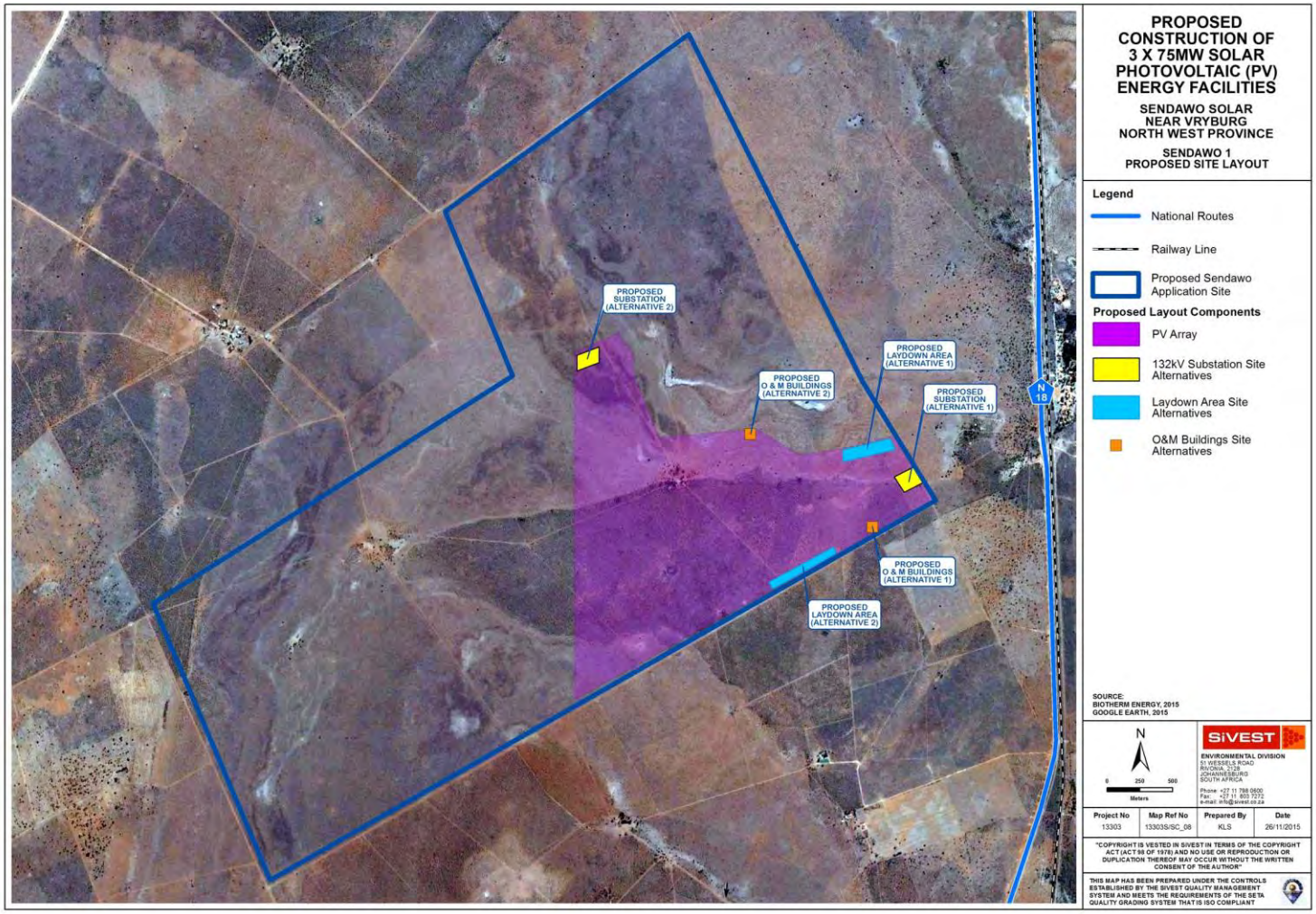

Figure 22: Proposed Layout Alternatives

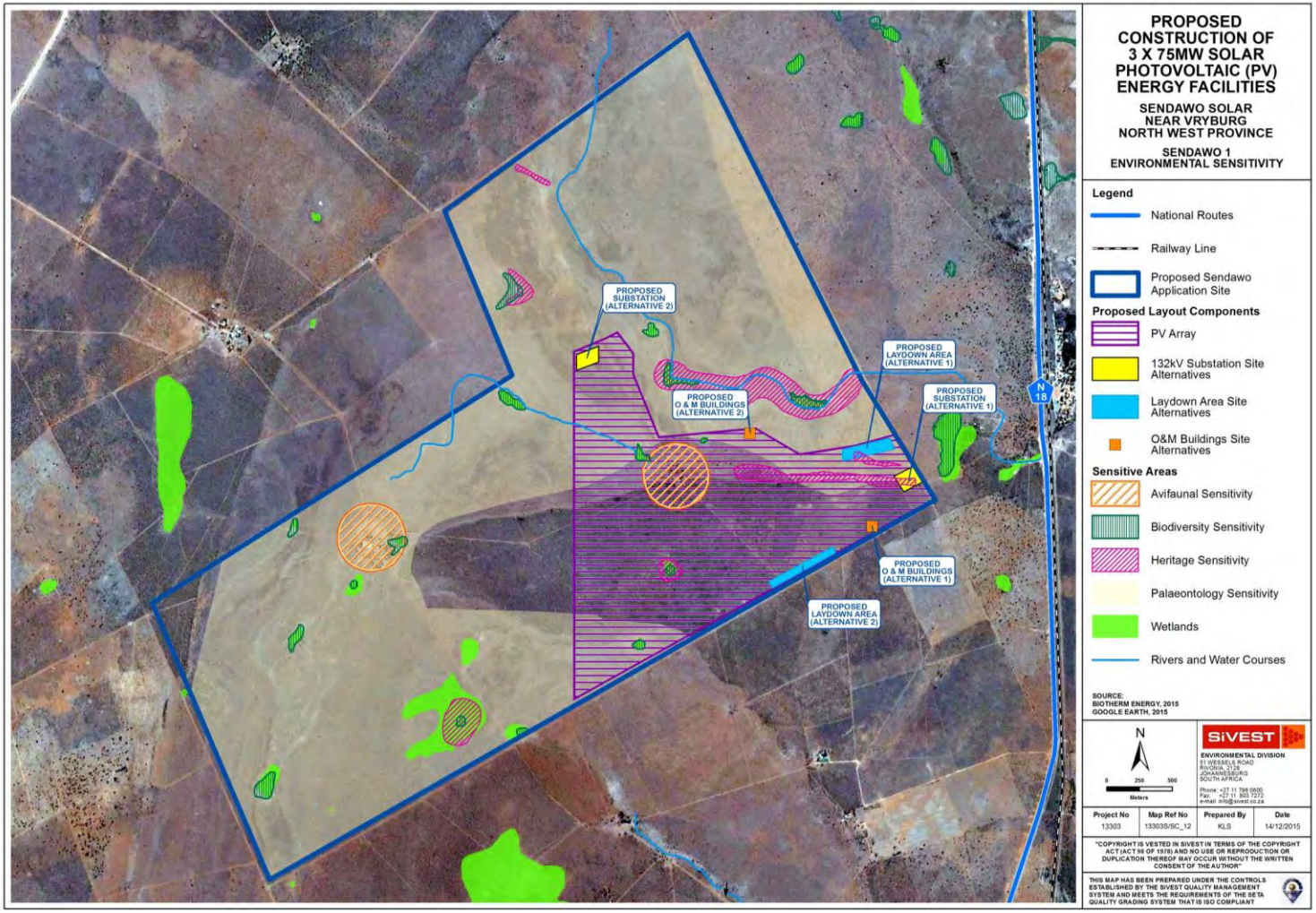

Figure 23: Proposed Layout Alternatives and sensitive areas

Key

PREFERRED	The alternative will result in a low impact / reduce the impact
FAVOURABLE	The impact will be relatively insignificant
NOT PREFERRED	The alternative will result in a high impact / increase the impact
NO PREFERENCE	The alternative will result in equal impacts

Table 68: Sendawo 1 Alternatives Assessment summarising the impacts, highlighting issues/concerns and indicating the preference associated with each alternative

ALTERNATIVE	PREFERENCE	CONCERNS / IMPACT SUMMARY
SUBSTATION SITE		
Proposed Substation Site Alternative 1	Favourable	Alternative 1 is not the preferred alternative due to the preliminary identification of possible heritage and palaeontological sensitive areas. However the alternative is still considered to be favourable because it is likely that impacts could be mitigated against.
Proposed Substation Site Alternative 2	Preferred	This alternative is environmentally preferred because only palaeontological sensitive areas were identified within the footprint of the proposed substation site.
LAYDOWN AREA		
Proposed Laydown Area Alternative 1	Favourable	Alternative 1 is not the preferred alternative due to the preliminary identification of possible palaeontological and heritage sensitive areas. However the alternative is still considered to be favourable because it is likely that impacts could be mitigated against.
Proposed Laydown Area Alternative 2	Preferred	Laydown Alternative 2 is the environmentally preferred alternative because no sensitive areas were identified within the proposed footprint.
O&M BUILDING		
Proposed O&M Buildings Alternative 1	Preferred	O&M Buildings Alternative 1 is the environmentally preferred alternative because no sensitive areas were identified within the proposed footprint.
Proposed O&M Buildings Alternative 2	Favourable	Alternative 2 is not the preferred alternative due to the preliminary identification of possible palaeontological sensitive areas. However the alternative is still considered to be favourable

		because it is likely that impacts could be mitigated against.

It is recommended that further studies be done on the proposed alternatives during the EIA phase, including specialist fieldwork. The potential significance of negative environmental impacts that may need to be mitigated are summarised below. These will be further assessed in the EIA Phase.

Table 69: Rating of impacts of Substation Alternative 1 on environmentally sensitive areas

IMPACT TABLE FORMAT	
Environmental Parameter	Avifauna, Biodiversity, Heritage, Wetlands, and Palaeontology
Issue/Impact/Environmental Effect/Nature	The proposed substation could impact indigenous natural vegetation, listed or protected plant and tree species, natural vegetation in pan depressions, or displace fauna or avifauna. The substation could also result in excessive run-off if the stormwater is not managed appropriately. Impacts on heritage and palaeontology could result if archaeological sites are uncovered during construction
Extent	Site (1)
Probability	Possible (2)
Reversibility	Partly reversible (2)
Irreplaceable loss of resources	Marginal loss (2)
Duration	Long term (2)
Cumulative effect	Medium (3)
Intensity/magnitude	Medium (2)
Significance Rating	Low negative impact
	Pre-mitigation impact rating
Extent	1
Probability	2
Reversibility	2
Irreplaceable loss	2
Duration	2
Cumulative effect	3
Intensity/magnitude	2
Significance rating	-24 (low negative)

Table 70: Rating of impacts of Substation Alternative 2 on environmentally sensitive areas

IMPACT TABLE FORMAT	
Environmental Parameter	Avifauna, Biodiversity, Heritage, Wetlands, and Palaeontology
Issue/Impact/Environmental Effect/Nature	The proposed substation could impact indigenous natural vegetation, listed or protected plant and tree species, natural vegetation in pan depressions, or displace fauna or avifauna. The substation could also result in excessive run-off if the stormwater is not managed appropriately. Impacts on heritage and palaeontology could result if archaeological sites are uncovered during construction
Extent	Site (1)
Probability	Possible (2)
Reversibility	Partly reversible (2)
Irreplaceable loss of resources	Marginal loss (2)
Duration	Long term (2)
Cumulative effect	Medium (3)
Intensity/magnitude	Low (1)
Significance Rating	Low negative impact
	Pre-mitigation impact rating
Extent	1
Probability	2
Reversibility	2
Irreplaceable loss	2
Duration	2
Cumulative effect	3
Intensity/magnitude	1
Significance rating	-12 (low negative)

Table 71: Rating of impacts of Laydown Area Alternative 1 on environmentally sensitive areas

IMPACT TABLE FORMAT	
Environmental Parameter	Avifauna, Biodiversity, Heritage, Wetlands, and Palaeontology
Issue/Impact/Environmental Effect/Nature	The proposed laydown area could impact indigenous natural vegetation, listed or protected plant and tree species, natural vegetation in pan depressions, or displace fauna or avifauna. The laydown area could also result in excessive run-off and

IMPACT TABLE FORMAT	
	therefore erosion if the stormwater is not managed appropriately. Impacts on heritage and palaeontology could result if archaeological sites are uncovered during construction
Extent	Site (1)
Probability	Possible (2)
Reversibility	Completely reversible (1)
Irreplaceable loss of resources	Marginal loss (2)
Duration	Long term (2)
Cumulative effect	Low (2)
Intensity/magnitude	Medium (2)
Significance Rating	Low negative impact
	Pre-mitigation impact rating
Extent	1
Probability	2
Reversibility	1
Irreplaceable loss	2
Duration	2
Cumulative effect	2
Intensity/magnitude	2
Significance rating	-20 (low negative)

Table 72: Rating of impacts of Laydown Area Alternative 2 on environmentally sensitive areas

IMPACT TABLE FORMAT	
Environmental Parameter	Avifauna, Biodiversity, Heritage, Wetlands, and Palaeontology
Issue/Impact/Environmental Effect/Nature	The proposed laydown area could impact indigenous natural vegetation, listed or protected plant and tree species, natural vegetation in pan depressions, or displace fauna or avifauna. The laydown area could also result in excessive run-off and therefore erosion if the stormwater is not managed appropriately. Impacts on heritage and palaeontology could result if archaeological sites are uncovered during construction
Extent	Site (1)
Probability	Possible (2)

IMPACT TABLE FORMAT	
Reversibility	Completely reversible (1)
Irreplaceable loss of resources	Marginal loss (2)
Duration	Long term (2)
Cumulative effect	Low (2)
Intensity/magnitude	Low (1)
Significance Rating	Low negative impact
	Pre-mitigation impact rating
Extent	1
Probability	2
Reversibility	1
Irreplaceable loss	2
Duration	2
Cumulative effect	2
Intensity/magnitude	1
Significance rating	-10 (low negative)

Table 73: Rating of impacts of O&M Building Alternative 1 on environmentally sensitive areas

IMPACT TABLE FORMAT	
Environmental Parameter	Avifauna, Biodiversity, Heritage, Wetlands, and Palaeontology
Issue/Impact/Environmental Effect/Nature	The proposed O&M Buildings could impact indigenous natural vegetation, listed or protected plant and tree species, natural vegetation in pan depressions, or displace fauna or avifauna. The O&M Buildings could also result in excessive run-off if the stormwater is not managed appropriately. Impacts on heritage and palaeontology could result if archaeological sites are uncovered during construction.
Extent	Site (1)
Probability	Possible (2)
Reversibility	Barely reversible (3)
Irreplaceable loss of resources	Marginal loss (2)
Duration	Long term (2)

IMPACT TABLE FORMAT	
Cumulative effect	Low (2)
Intensity/magnitude	Low (1)
Significance Rating	Low negative impact
	Pre-mitigation impact rating
Extent	1
Probability	2
Reversibility	3
Irreplaceable loss	2
Duration	2
Cumulative effect	2
Intensity/magnitude	1
Significance rating	-12 (low negative)

Table 74: Rating of impacts of O&M Building Alternative 2 on environmentally sensitive areas

IMPACT TABLE FORMAT	
Environmental Parameter	Avifauna, Biodiversity, Heritage, Wetlands, and Palaeontology
Issue/Impact/Environmental Effect/Nature	The proposed O&M Buildings could impact indigenous natural vegetation, listed or protected plant and tree species, natural vegetation in pan depressions, or displace fauna or avifauna. The O&M Buildings could also result in excessive run-off if the stormwater is not managed appropriately. Impacts on heritage and palaeontology could result if archaeological sites are uncovered during construction
Extent	Site (1)
Probability	Possible (2)
Reversibility	Barely reversible (3)
Irreplaceable loss of resources	Marginal loss (2)
Duration	Long term (2)
Cumulative effect	Low (2)
Intensity/magnitude	Medium (2)
Significance Rating	Low negative impact

IMPACT TABLE FORMAT	
	Pre-mitigation impact rating
Extent	1
Probability	2
Reversibility	3
Irreplaceable loss	2
Duration	2
Cumulative effect	2
Intensity/magnitude	2
Significance rating	-24 (low negative)

8 PUBLIC PARTICIPATION PROCESS

Public participation is the cornerstone of any EIA. The principles of NEMA as well as the EIA Regulations govern the EIA process, including public participation. These include provision of sufficient and transparent information on an ongoing basis to stakeholders to allow them to comment, and ensuring the participation of previously disadvantaged people, women and the youth.

The public participation process is primarily based on two factors; firstly, ongoing interaction with the environmental specialists and the technical teams in order to achieve integration of technical assessment and public participation throughout. Secondly, to obtain the bulk of the issues to be addressed early on in the process, with the latter half of the process designed to provide environmental and technical evaluation of these issues. These findings are presented to stakeholders for verification that their issues have been captured and for further comment.

Input into the public participation process by members of the public and stakeholders can be given at various stages of the EIA process. Registration on the project can take place at any time during the EIA process up until the final EIA report is submitted to DEA. There are however set periods in which comments are required from Interested and / or Affected Parties (I&APs) in order to ensure that these are captured in time for the submission of the various reports. The comment periods during the scoping phase were implemented according to NEMA EIA Regulations. The comment periods during the scoping phase (as set out by EIA Regulations 2014) are as follows:

- Comment period for the Draft Scoping Report (DSR): 4 Calendar weeks (30 days).
- Any public participation process must be conducted for a period of at least 30 days.

The EIA regulations emphasise the importance of public participation. In terms of the EIA regulations, registered interested and/or affected parties –

- may participate in the application process;
- may comment on any written communication submitted to the competent authority by the applicant or environmental consultant;

- must comment within the timeframes as stipulated by the EIA Regulations;
- must send a copy of any comments to the applicant or Environmental Assessment Practitioner (EAP) if the comments were submitted directly to the competent authority; and
- must disclose any direct business, financial, personal or other interests that the person has in the application being granted or refused.

Further, in terms of the EIA regulations, the EAP:
- manages the application process;
- must be independent;
- must undertake the work objectively – even if this results in views and findings that are not favourable to the applicant;
- must disclose material information that may influence the decision; and
- must conduct a public participation process.

The following actions were taken upon receiving comments/queries/issues:
- The contact details provided were entered into the project database for use in future notifications.
- Confirmation of receipt of comments.
- Addressed comments in the Comments & Response Report.

8.1 Objectives of Public Participation

An understanding of what the public participation is, and is what it is not, needs to be explored and must be clarified.

- Public Participation is:
    - A communication mechanism to inform I&APs regarding a proposed project.
    - A communication mechanism to record comments and/or concerns raised during the relevant phase of the EIA by I&APs regarding a proposed project.

- What Public Participation is not:
    - A marketing exercise.
    - A process to address grievances but rather to record comments raised.
    - One-on-one consultation with each I&AP during the EIA process (not relevant to possibly affected landowners identified).

The primary aims of the PPP are:
- To inform interested and affected parties (I&APs) and key stakeholders of the proposed development.
- To initiate meaningful and timeous participation of I&APs.
- To identify issues and concerns of key stakeholders and I&APs with regards to the proposed development

- To promote transparency and an understanding of the proposed project and its potential environmental impacts.
- To provide information used for decision-making.
- To provide a structure for liaison and communication with I&APs and key stakeholders.
- To assist in identifying potential environmental impacts associated with the proposed development.
- To ensure inclusivity (the views, needs, interests and values of I&APs must be considered in the decision-making process).
- To focus on issues relevant to the project and issues considered important by I&APs and key stakeholders.
- To provide responses to I&AP queries.
- To encourage co-regulation, shared responsibility and a sense of ownership.

In addition to the guidance of the PPP in the EIA Regulations, every effort was also made to conform to the requirements of the Promotion of Administrative Justice Act 2000 (Act 3 of 2000).

8.2 Overview of the Public Participation Process to date

The public participation process for the EIA was initiated in early December 2015 with the issuing of the BID and initial landowner consultation. The DSR was released for review on the 5th of January 2016. The stages that typically form part of the public participation process during the scoping phase are reflected in **Figure 24** below.

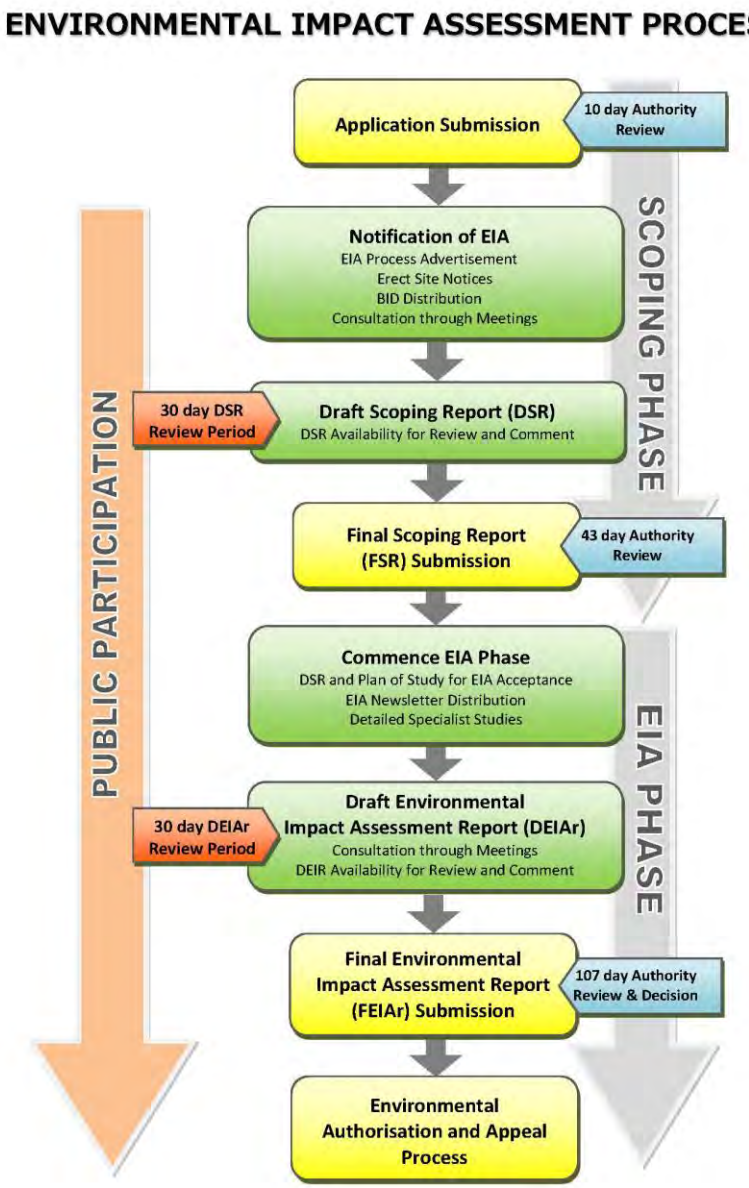

Figure 24: EIA and Public Participation Process

Members of the public who wished to be registered on the database as an I&AP were able to do so via telephone, fax, email, mail or SiVEST's website (www.sivest.co.za).

On-going consultation with key stakeholders (e.g. provincial, district and local authorities, relevant government departments, local business etc.) and identified I&APs ensured that I&APs were kept informed regarding the EIA process. Networking with I&APs will effectively continue throughout the scoping phase of the project until the Final Scoping Report and EIA Plan of Study are submitted to DEA. Where required, stakeholders and I&APs were engaged on an individual basis.

During the environmental studies, consultations were held with individuals, businesses, institutions and organisations, and the following sectors of society have been identified and were afforded the opportunity to comment (the full stakeholder database list is included in Appendix 7F):

- National Authorities;
- Provincial Authorities;
- Naledi LM;
- Dr Ruth Segomotsi Mompati DM;
- Government Structures such as SAHRA, SANRAL, Telkom, etc.;
- Agriculture Associations;
- Regional and local media (advertisements and public documents e.g. BID);
- Business and commerce;
- Environmental bodies / NGOs;
- Community representatives, CBOs, development bodies;
- Landowners; and
- Civil Aviation Authority (CAA).

8.3 Consultation and Public Involvement

Through the consultation process, issues for inclusion within the DSR will be identified and confirmed. Telephonic discussions and one-on-one consultation will be undertaken where relevant. Meetings with landowners will take place prior to the release of the DSR in order to identify key issues, needs and priorities for input into the proposed project. Special attention will be paid to the consultation with possibly affected landowners and communities within the study area to try and address their main concerns.

8.4 Stakeholders and I&APs

In order to identify possible I&APs, use will be made of:

- print media – EIA process advertisements
    - The Stellalander newspaper
- site notices throughout the study area (Proofs included in Appendix 7A)
- referrals
- requesting databases and/or contact information from NGOs / CBOs and other organisations

A full database list of registered I&APs was compiled and is included in Appendix 7F.

8.5 Announcing the Opportunity to Participate

The opportunity for stakeholders to participate in the EIA were as follows:

- EIA process advert (date to be confirmed - January 2016).
- I&APs with e-mail addresses and fax numbers were sent copy of the BID.
- BIDs were delivered to various locations within the study area:

The letter of invitation to participate as well as the Registration and Comment Form accompanied the BID.

8.6 Notification of the Potential Interested and Affected Parties

Communication with I&APs were conducted by means of telephone, faxes and email in order to obtain the necessary background information to compile this report. The advertising process was followed in terms of regulation 41 of the EIA Regulations published in R982 in Government Gazette No. 38282 of 4 December 2015, as amended.

An advertisement will be placed in the Stellalander newspaper in January 2016.

In addition, many site notices (as per regulations) were placed near the study area during a site visit on Thursday and Friday the 3rd and 4th of December 2015.

As stakeholders respond to these advertisements, they will be registered on the project database and sent letters of invitation to participate as well as the BID.

8.7 Proof of Notification

Appendix 7 includes all proof of notification of Interested and Affected Parties. More specifically, the types of proofs are as follows:

- Site notice text (Appendix 7A)
- Photographs of site notices (Appendix 7A)
- Proof of advertisements in the newspapers (Appendix 7C)
- Background Information Document (Appendix 7B)
- Correspondence to registered I&APs and key stakeholders (Appendix 7D)

8.8 Focus Group Meetings

Focus Group Meetings (FGMs) were held with affected and surrounding landowners from the 2nd to the 4th of December 2015. Additional FGMs were also held with Local Municipality officials and councillors

as well as community leaders on Thursday the 3rd of December 2015 and Friday the 4th of December 2015. FGMs are smaller meetings with specific groups or organisations who have similar interests in or concerns about the project. This process is ongoing and will continue throughout the EIA phase.

Following all meetings, minutes will be compiled and forwarded to all attendees for their review and comment. The primary aim of these meetings was to:

- disseminate information regarding the proposed development to I&APs
- provide I&APs with an opportunity to interact with the EIA team and the BioTherm representatives present.
- supply more information regarding the EIA process;
- answer questions regarding the project and the EIA process;
- receive input regarding the public participation process and the proposed development.

8.9 One-on-One Consultation

Where possible, potentially directly affected landowners were consulted on a one-on-one basis and informed about the proposed project. Any comments and/or concerns received will be noted and included in the Comments and Responses Report.

This consultation process is seen as one of the important aspects of the EIA and Public Participation process. Should the proposed project be granted an Environmental Authorisation, these particular stakeholders will be directly affected and their properties impacted upon. The consultation process will also ensure that as many uncertainties and concerns as possible are raised upfront and channelled to BioTherm to ensure that the stakeholders and the applicant are informed about these issues throughout the process.

8.10 Comments and Response Report

Issues, comments and concerns raised during the public participation process were captured in the Comments and Response Report (C&RR) included as Appendix 7E. This C&RR provides a summary of the issues raised, as well as responses which were provided to I&APs. This information will be used to feed into the evaluation of social impacts. A separate section to the C&RR will be added to the Final Scoping Report to reflect the comments received during the review period from I&APs on the DSR.

8.11 Comments on Draft Scoping Report

The Draft Scoping Report will be made available for public review after submission to DEA, the competent authority.

The report will be out for public review and comment for a period of 30 calendar days. Written notice will be given to all registered I&APs as well as all key stakeholders on the database that the DSR will be available for public review.

Electronic copies (CD) of the report will also be made available and will be distributed on written request.

8.12 Authority Review of the Draft Scoping Report

In terms of section 40 (2) of the EIA Regulations (as amended), under Government Notices No R982, public participation must include consultation with all organs of state which have jurisdiction in respect of the activity to which the application relates.

Table 75 below includes all the organs of state who will be e-mailed the DSR and sent electronic copies (on CD) of the full report including all appendices. Telephonic follow-up with stakeholders will be done in order to provide them with ample opportunity to comment.

Table 75: Authorities follow-up consultation

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED DEVELOPMENT OF THE THREE SENDAWO 75MW SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITIES NEAR VRYBURG, NORTH WEST PROVINCE					
DISTRIBUTION OF THE DRAFT SCOPING REPORT (DSR) TO ORGANS OF STATE FOR COMMENT					
TITLE	**SURNAME**	**NAME**	**POSITION**	**POSTAL ADDRESS**	**EMAIL ADDRESS**
NALEDI LOCAL MUNICIPALITY					
Mr	Segapo	Modisenyane	Municipal Manager	PO Box 35 VRYBURG 8600	municipalmanager@naledi.local.gov.za
Ms	Mboyisi	Nombulelo	Environmental Health Practitioner	PO Box 35 VRYBURG 8600	mboyisin@naledi.local.gov.za
DR RUTH SEGOMOTSI MOMPATI DISTRICT MUNICIPALITY					

Mr	Tshetlho	Zebo	Municipal Manager	Private Bag 21 VRYBURG 8600	keoagileo@bophirima.co.za
Mr	Tlhabanelo	Victor	Environmental Manager	Private Bag 21 VRYBURG 8600	tlhabanelov@bophirima.co.za
NORTH WEST DEPARTMENT OF ENERGY					
Mr	Sethosa	Tebogo		Pvt Bag X2075 MMABATHO 2745	Tebogo.sethosa@energy.gov.za
Ms	Mahlaku	Matshediso		Pvt Bag X2075 MMABATHO 2745	Matshediso.mahlaku@energy.gov.za
DEPARTMENT OF WATER AND SANITATION					
Ms	Matsheka	SM		Private Bag X5 MMABATHO 2735	MatshekaS@dwa.gov.za
Mr	Bogopa	L		Private Bag X5 MMABATHO 2735	
NORTH WEST DEPARTMENT OF RURAL, ENVIRONMENTAL AND AGRICULTURAL DEVELOPMENT					
Ms	Mohlakoana	Bonolo	Communications Officer	Private Bag X2039 MMABATHO 2735	bmohlakoana@nwpg.gov.za
DEAPARTMENT OF AGRICULTURE, FORESTRY AND FISHERIES					
Ms	Marubini	Mashudu	Assistant Director	Private Bag X120 PRETORIA 0001	mashuduma@daff.gov.za
DEPARTMENT OF MINERAL RESOURCES (DMR)					
Mr	Swart	Pieter		Private bag a1 KLERKSDORP 2570	Pieter.Swart@dmr.gov.za
SANRAL					

Ms	Abrahams	Nicolene	Environmental Coordinator	Private Bag X19 BELLVILLE 7535	abrahamsn@nra.co.za
Mr	Dyers	Shaun	Manager: Statutory Control	Private Bag X19 BELLVILLE 7535	Dyerss@nra.co.za
NORTH WEST DEPARTMENT OF ROADS AND TRANSPORT					
Mr	Mafune	Alfred	Head of Department	Private Bag x2080 MMABATHO 2735	
SAHRA: HEAD OFFICE					
Ms	Lavin	Jenna	Heritage Officer: Northern Cape	PO Box 4637 CAPE TOWN 8000	jlavin@sahra.org.za
ESKOM					
Mr	Geeringh	John	Chief Planner	PO Box 1091 JOHANNESBURG 2000	GeerinJH@eskom.co.za
SA CIVIL AVIATION AUTHORITY (SA CAA)					
Mr	Roberts	Harry		Private Bag X73 HALFWAY HOUSE 1685	Robertsh@caa.za
Ms	Stoh	Lizell	Obstacle Specialist	Private Bag X73 HALFWAY HOUSE 1685	strohl@caa.co.za
AIR TRAFFIC AND NAVIGATION SERVICES (ATNS)					
Ms	Morobane	Johanna	Manager: Corporate Sustainability and Environment	Private Bag X15 KEMPTON PARK 1620	JohannaM@atns.co.za

Mr	Masilela	Simphiwe	Obstacle Evaluator		SimphiweM@atns.co.za
TRANSNET FREIGHT RAIL					
Mr	Fiff	Sam	Environmental Manager: Freight Rail	PO Box 255 BLOEMFONTEIN 9300	sam.fiff@transnet.net
SENTECH					
Mr	Koegelenberg	Johan	Renewable Projects	Private Bag X06 Honeydew 2040	koegelenbergj@sentech.co.za
TELKOM					
Mr	Bester	Amanda	Wayleave Officer	Private Bag X20700 BLOEMFONTEIN 9300	WayleaCR@telkom.co.za BesterAD@telkom.co.za
ENDANGERED WILDLIFE TRUST					
Mr	Leeuwner	Lourens	Renewable Energy Project	The Endangered Wildlife Trust, Private Bag X11, Modderfontein, 1609, Johannesburg	lourensl@ewt.org.za
WESSA					
Ms	Erasmus	Suzanne	EIA Coordinator, Wildlife and Energy Programme	PO Box 316 KIMBERLEY 8300	info@wessa.co.za wessanc@yahoo.com
BIRDLIFE SOUTH AFRICA					
Mr	Gear	Simon	Policy and Advocacy Manager	PO Box 515 RANDBURG 2125	advocacy@birdlife.org.za

9 ASSESSMENT IN TERMS OF EQUATOR PRINCIPLES

The Equator Principles are a financial industry benchmark for determining, assessing and managing social & environmental risk in project financing. A number of banks, exchanges and organisations worldwide have adopted the Principles as requirements to be undertaken for project funding on application and approval. Furthermore, certain funding institutions have not formally adopted the Principles, but require clients to be compliant with them in order to qualify for loans. The Equator Principles are summarised below:

Principle 1: Review and Categorisation
When a project is proposed for financing, the Equator Principles Funding Institution ("EPFI") will categorise the project based on the magnitude of its potential environmental and social impacts and risks.

Principle 2: Environmental and Social Assessment
For each project assessed as being either Category A or Category B, the client / borrower must conduct a Social and Environmental Assessment ("Assessment") process to address the relevant impacts and risks of the proposed project. The Assessment should also propose mitigation and management measures relevant and appropriate to the nature and scale of the proposed project.

Principle 3: Applicable Environmental and Social Standards
The Assessment will refer to the applicable IFC Performance Standards and applicable Industry Specific Environmental, Health, and Safety (EHS) Guidelines.

Principle 4: Environmental and Social Management System and Equator Principles Action Plan
The client / borrower must prepare an Environmental and Social Management System (ESMS). Further, an Environmental and Social Management Plan (ESMP) must be prepared by the client to address issues raised in the Assessment process and incorporate actions required to comply with the applicable standards. Where applicable standards are not met to the EPFI's satisfaction, the client and the EPFI will agree to an Equator Principles Action Plan to outline gaps and commitments.

Principle 5: Stakeholder Engagement
For all Category A and Category B Projects, the EPFI will require the client to demonstrate effective Stakeholder Engagement as an ongoing process in a structured and culturally appropriate manner with Affected Communities and, where relevant, Other Stakeholders. For Projects with potentially significant adverse impacts on Affected Communities, the client will conduct an Informed Consultation and Participation process. The client will tailor its consultation process to: the risks and impacts of the Project; the Project's phase of development; the language preferences of the Affected Communities; their decision-making processes; and the needs of disadvantaged and vulnerable groups.

Principle 6: Grievance Mechanism
The EPFI will require the client, as part of the ESMS, to establish a grievance mechanism designed to receive and facilitate resolution of concerns and grievances about the Project's environmental and

social performance. The grievance mechanism is required to be scaled to the risks and impacts of the Project and have Affected Communities as its primary user. It will seek to resolve concerns promptly, using an understandable and transparent consultative process that is culturally appropriate, readily accessible, at no cost, and without retribution to the party that originated the issue or concern. The mechanism should not impede access to judicial or administrative remedies.

Principle 7: Independent Review
For all Category A projects and, as appropriate, for Category B projects, an independent social or environmental expert not directly associated with the borrower must review the Assessment, AP and consultation process documentations in order to assist the EPFIs due diligence, and assess Equator Principles compliance.

Principle 8: Covenants
An important strength of the Principles is the incorporation of covenants linked to compliance. For all Projects, the client will covenant in the financing documentation to comply with all relevant host country environmental and social laws, regulations and permits in all material respects. For Category A and B projects, the client / borrower will covenant in financing documentation:

- To comply with the ESMPs and Equator Principles AP (where applicable) during the construction and operation of the Project in all material respects; and

- To provide periodic reports in a format agreed with the EPFI (with the frequency of these reports proportionate to the severity of impacts, or as required by law, but not less than annually), prepared by in-house staff or third party experts, that i) document compliance with the ESMPs and Equator Principles AP (where applicable), and ii) provide representation of compliance with relevant local, state and host country environmental and social laws, regulations and permits; and

- To decommission the facilities, where applicable and appropriate, in accordance with an agreed decommissioning plan.

Principle 9: Independent Monitoring and Reporting
To ensure ongoing monitoring and reporting over the life of the loan, EPFIs will, for all Category A projects, and as appropriate, for Category B projects, require appointment of an independent environmental and/or social expert, or require that the borrower to retain qualified and experienced external experts to verify its monitoring information, which would be shared with EPFIs.

Principle 10: Reporting and Transparency
For all Category A and, as appropriate, Category B Projects:

- The client will ensure that, at a minimum, a summary of the ESIA is accessible and available online.

- The client will publicly report GHG emission levels (combined Scope 1 and Scope 2 Emissions) during the operational phase for Projects emitting over 100,000 tonnes of CO_2 equivalent annually.

Although this report is not written in terms of the Equator Principles (EPs), it fully acknowledges that EPs will need to be complied with should funding for the project be required. In general, the following documentation will need to be considered in that regard:

- The "Equator Principles" 2013
- International Finance Corporations Performance Standards on Social and Environment, IFC, January 2012, namely:
    - Performance Standard 1: Social and Environmental Assessment and Management Systems
    - Performance Standard 2: Labour and Working Conditions
    - Performance Standard 3: Pollution Prevention and Abatement
    - Performance Standard 4: Community Health, Safety and Security
    - Performance Standard 5: Land Acquisition and Involuntary Resettlement
    - Performance Standard 6: Biodiversity Conservation and Sustainable Natural Resource Management
    - Performance Standard 7: Indigenous Peoples
    - Performance Standard 8: Cultural Heritage

- International Finance Corporation – World Bank Guidelines, General EHS Guidelines 2007.

EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice. These EHS Guidelines are applied as required by the World Bank's respective policies and standards. These General EHS Guidelines are designed to be used together with the relevant Industry Sector EHS Guidelines which provide guidance to users on EHS issues in specific industry sectors.

- The EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs.

9.1 Assessment Results

This section details the current compliance level with which the solar PV energy facility projects meets with the Equator Principles and the related Performance Standards which are outlined below.

Table 76: Solar PV energy facility Compliance Level in terms of Equator Principles and Related Performance Standards.

The coding key is as follows:

Compliance Level			
Clear			
Not assessed/ determined	Not compliant	Partially compliant	Compliant

Principles	Compliance Level	Reference
General, Performance Standard 1 Environmental & Social Reporting		
1. Baseline Information		Refer to Chapter 2 – Technical Details and Chapter 5 – Description of the receiving environment
2. Alternatives (Assessment of alternatives)		Refer to Chapter 7
3. Impacts and risks		Refer to Chapter 6
4. Global impacts		N/A
5. Legal requirements		Refer to Chapter 3
6. Transboundary		N/A
7. Disadvantaged / vulnerable groups		Partly addressed in 5.13 and will be addressed as part of the EMPr during the EIA phase
8. Third party		Refer to section 1.1.
9. Mitigation measures		Partly addressed in section 6.2 and will be addressed as part of the EMPr during the EIA phase
10. Documentation process		Refer to Chapter 1, Chapter 3 Sections 3.1.1 and 3.1.2 and Chapter 7
11. Action Plans		To be addressed during the EIA phase
12. Organisational capacity		To be addressed as part of the EMPr during the EIA phase
13. Training		To be addressed as part of the EMPr during the EIA phase
14. Grievance mechanism		To be addressed during the EIA phase
15. Report content		To be addressed as part of the EMPr during the EIA phase

Principles	Compliance Level	Reference
Performance Standard 2, Labour & Working Conditions		
1. Human Resource Policy		To be addressed as part of the EMPr during the EIA phase
2. Working relationship		To be addressed as part of the EMPr during the EIA phase
3. Working conditions with and terms of employment		To be addressed as part of the EMPr during the EIA phase
4. Workers organisation		To be addressed as part of the EMPr during the EIA phase
5. Non-discrimination and equal opportunities		Refer to Chapter 2, section 2.15. This issue will also be addressed as part of the EMPr during the EIA phase
6. Grievance mechanism		To be addressed as part of the EMPr during the EIA phase
7. Occupational Health and Safety		To be addressed as part of the EMPr during the EIA phase
8. Non-employee workers		To be addressed as part of the EMPr during the EIA phase
9. Supply Chain		To be addressed as part of the EMPr during the EIA phase
10. Labour Assessment Component of a Social and Environmental Assessment		To be addressed as part of the EMPr during the EIA phase
Performance Standard 3, Pollution		
1. Pollution Prevention, Resource Conservation and Energy Efficiency		To be addressed as part of the EMPr during the EIA phase
2. Wastes		To be addressed as part of the EMPr during the EIA phase
3. Hazardous material		To be addressed as part of the EMPr during the EIA phase
4. Dangerous substances		To be addressed as part of the EMPr during the EIA phase
5. Emergence preparedness and response		To be addressed as part of the EMPr during the EIA phase

Principles	Compliance Level	Reference
6. Technical guidance – ambient considerations		To be addressed as part of the EMPr during the EIA phase
7. Greenhouse gas emissions		N/A
Performance Standard 4, Health & Safety		
1. Hazardous materials safety		To be addressed as part of the EMPr during the EIA phase
2. Environmental and natural resource issues		Refer to Chapter 6
3. Emergency preparedness and response		To be addressed in the EMPr during the EIA phase
Performance Standard 5, Land Acquisition		Refer to Chapter 4
Performance Standard 6, Biodiversity		Refer to Chapter 5, section 5.7 and Chapter 6, section 6.1.1
Performance Standard 7, Indigenous People		Refer to Chapter 8
Performance Standard 8, Cultural Heritage		Refer to Chapter 5, section 5.12 and Chapter 6, section 6.1.6

It is important to note that, most of the issues listed per performance standard in the table above will only be addressed during the EIA phase. Therefore at this stage (scoping phase), most of the issues are categorised as “not assessed/ to be determined”. Full compliance with the EPs will only be realised following EIA assessments.

10 CONCLUSIONS AND RECOMMENDATIONS

The above report provides a broad introduction to the issues that are pertinent to the proposed Sendawo solar PV energy facility, and highlights important issues to be investigated during the EIA Phase of the project. The EIA Phase will draw on the above information and make use of the recommended specialist studies to reach an objective decision on the overall impact of the proposed development.

The EIA Phase will culminate in the compilation of detailed mitigation measures to reduce impacts, the identification of least impactful locations for the solar PV arrays, the identification of least impactful locations for associated infrastructure and the identification of sensitive areas within the site which may require more specific management measures. The EIA Phase will also aim to optimise and improve potential positive impacts that may result from the proposed development.

10.1 Conclusions

No specialist study conducted during the Scoping phase for the proposed development has identified any fatal flaws for the proposed Sendawo project site.

However, a number of potentially significant (positive and negative) environmental impacts have been identified and will need to be evaluated during the detailed EIA phase of the project. In addition, the EIA Phase will provide a more detailed comparative analysis of these potential impacts against the "no-go" alternative.

Detailed mitigation and management measures will be developed during the Environmental Management Programme (EMPr) phase of the project, in response to the detailed assessment, and will be run towards the end of EIA phase of the project. Should this project receive a positive environmental authorisation, the EMPr will guide the project proponent and appointed contractor(s) through the final design, construction and operational phases of the proposed project.

10.1.1 Summary of Findings

A summary of the findings for each identified environmental impact evaluated in the context of the proposed development (both biophysical and social) is provided in the table below.

Table 77: Summary of environmental issues identified in Specialist Studies.

Aspect	Potential impacts
Biodiversity	▪ Loss of indigenous natural vegetation during construction; ▪ Impacts on listed plant species; ▪ Impacts on a protected plant species; ▪ Impacts on protected tree species;

Aspect	Potential impacts
	▪ Impacts on pan depressions; ▪ Mortality of populations of sedentary species during construction (terrestrial and aquatic); ▪ Displacement of populations of mobile species (terrestrial); ▪ Mortality of bird species of concern due to secondary factors, such as collisions with overhead power lines; ▪ Introduction and/or spread of declared weeds and alien invasive plants in terrestrial habitats.
Avifauna	▪ Mortality of priority species due to collisions with the PV panels. ▪ Displacement of priority species due to habitat transformation and disturbance. ▪ Disturbance of breeding raptors and roosting vultures on the existing high voltage lines.
Surface Water	▪ Impacts associated with the construction lay-down area directly in surface water resources ▪ Impacts associated with establishing the foundations of the proposed PV facilities; ▪ Impacts associated with the clearing of vegetation for the proposed development of the PV facilities; ▪ Impacts associated with the abnormal/heavy vehicle access into surface water resource areas; ▪ Impacts associated with the general construction access near or in surface water resource areas; ▪ Impacts associated with improper stormwater management effects on nearby surface water resources; ▪ Impacts associated with the oil, fuel and other soluble substances from construction activities, vehicles and machinery into nearby surface water resources; and ▪ Impacts associated with the 132kV power line installation into/over nearby surface water resources. ▪ Impacts associated with power line service roads through surface water resources; ▪ Stormwater run-off associated with the PV energy facility and associated infrastructure; and ▪ Oil leakages from the switching station.
Soils and Agricultural Potential	▪ Loss of agricultural potential because soil would be impacted by the establishment of infrastructure
Visual	▪ The natural visual character of the surrounding area could be altered. ▪ The facility would likely be highly visible for great distances, thus altering the relatively untransformed rural sense of place within the surrounding area. ▪ The proposed development could adversely affect farmsteads / homesteads within the visual assessment zone.

Aspect	Potential impacts
	▪ Vehicles and trucks travelling to and from the proposed site would increase dust emissions during both the construction and operational phases. The dust plumes could create a visual impact and may evoke negative sentiments from surrounding viewers. ▪ Surface disturbance during construction would expose bare soil which could visually contrast with the surrounding environment. In addition, temporarily stockpiling of soil during construction may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact. ▪ Security and operational lighting at the PV energy facility could result in light pollution and glare, which could be an annoyance to surrounding viewers. ▪ Potential visual impacts as a result of the infrastructure associated with the proposed PV energy facility.
Heritage	▪ Impact on archaeological sites ▪ Impact on palaeontological sites ▪ Impact on historical sites
Socio-economic	▪ Impact of the increase in production and GDP-R of the national and local economies due to project capital expenditure ▪ Impact of the creation of temporary employment in the local communities and elsewhere in the country ▪ Impact of skills development due to the creation of new employment opportunities ▪ Impact of improved standard of living of households directly or indirectly benefiting from created employment opportunities ▪ Impact of the increase in government revenue due to investment ▪ Impact of the potential sterilisation of agricultural land ▪ Impact of a negative financial and social impact associated with the relocation of affected households ▪ Impact of a change in demographics of the area due to influx of workers and job seekers ▪ Impact of an increase in social pathologies associated with influx of migrant labourers and job seekers to the area (health, crime, prostitution, xenophobia, etc.) ▪ Impact of added pressure on basic services and social and economic infrastructure ▪ Impact of the increase in generation capacity in the province as well as the advancement of the RE sector in achieving long term, sustainable supply ▪ Impact of the sustainable increase in production and GDP-R of the national and local economies through operation and maintenance activities ▪ Impact of the creation of long-term employment in local and national economies through operation and maintenance activities ▪ Impact of skills development due to the creation of new sustainable employment opportunities

Aspect	Potential impacts
	▪ Impact of improved standard of living of households directly or indirectly benefiting from created employment opportunities ▪ Impact of an increase in government revenue stream ▪ Impact of investment in the local communities and economic development projects as part of a Social Economic Development and Enterprise Development plan ▪ Impact of an altered sense of place ▪ Impact on commercial property and land values in the surrounding area

Based on the specialist studies, the following conclusions can be reached for each environmental parameter assessed.

Table 78: Conclusions of Specialist Studies.

Biodiversity	The biodiversity specialist report concludes that there are some issues related to the ecology of the site that could result in potentially significant ecological impacts. The seriousness of many of these impacts can be determined during the field investigation of the site. Some impacts require permits to be issued, either by National or Provincial authorities and field data is required for the permit applications.
Avifauna	The proposed project is located in the endemic region with the fourth highest number of endemics in southern Africa. With 20% of all southern African endemics or near endemics potentially occurring at the core study area and immediate surroundings, the application site and immediate surroundings as a whole should be regarded as moderately sensitive from an avifaunal perspective. Potentially high sensitive, no-go areas were identified in the core study area, i.e. water troughs. Rivers and high voltage lines were identified as potential high sensitive areas in the immediate surroundings, as both these micro-habitats are potential focal points of bird activity. Water troughs (boreholes) could potentially be declassified as high sensitivity should it be confirmed that they will be removed and therefore cease to function as potential focal points for bird activity after the construction of the solar panels. In the case of the existing Mercury-Ferrum 400kV line, the sensitivity and potential no-go areas will only become apparent once a field investigation has been conducted. Should no priority raptor nests be present, there will be no need for buffer zones. However, if there are nests present, an appropriate buffer zone will be required around the nest, depending on the species. In the case of a Red Data species such as a Martial Eagle, this would necessitate a buffer zone of at least 1.5km.
Surface water	Database findings revealed that there were no surface water resources, such as rivers and wetlands, located within the study area. Two (2) NFEPA identified rivers, namely the Droe Harts and Korobela, and one (1) WETFEPA identified un-channelled valley bottom wetland were, however, located within relatively close proximity to the study area. Additionally, a large part of the study area was deemed to fall within a CBA 2 area with a small portion also falling within an ESA 1 area,

	as identified by the North West Province Biodiversity Conservation Assessment, 2009. The desktop findings supported the presence of the two (2) NFEPA identified rivers, namely the Droe Harts and the Korobela, as well as the one (1) artificial un-channelled valley bottom wetland observed in the database findings. However, the desktop assessment findings revealed two (2) segments of the Droe Harts River which were found to pass through the study area. In addition, twelve (12) valley bottom wetlands and twenty two (22) depression wetlands were also identified as part of the desktop assessment. Seventeen (17) of these desktop identified wetlands were located within the study area. It must be noted however, that from a desktop findings perspective, some of these wetland systems appeared to be connected as one greater system while others appeared to be separate isolated systems.
Soils and Agricultural Potential	Virtually all of the study area comprises shallow, calcareous soils with rock (land type Ae36). Coupled with these shallow soils, the low rainfall in the area means that the only means of reliable cultivation would be by irrigation and the Google Earth image of the area shows absolutely no signs of any agricultural infrastructure and certainly none of irrigation. The climatic parameters mean that this part of North West is well suited for grazing but here the grazing capacity is relatively low, around 12 ha/large stock unit. Therefore, the predicted impact is low, as soils are shallow and climate unfavourable for cultivation.
Visual	A scoping-level visual study has been conducted to identify the potential visual impact and issues related to the development of the solar PV energy facility near Vryburg in the North West Province. The study area has a rural visual character with a low to moderate visual sensitivity. However, several solar energy facilities are proposed within relatively close proximity to the proposed PV facility. These facilities and their associated infrastructure, will significantly alter the visual character and baseline in the study area if constructed and make it appear to have a more industrial-type visual character. The proposed PV energy facility development is likely to visually influence twenty-four (24) receptors identified within the visual assessment zone, twenty-one (21) of which are farmsteads, and as such these are regarded to be potentially sensitive visual receptor locations. The sensitivity of the receptor locations will need to be confirmed through further assessment in the next phase of the study. The nature of the visual impacts associated with a development of this size on the receptors in the assessment zone could be significant.
Heritage	The proposed Sendawo Solar project may have heritage resources present on the property. This has been confirmed through archival research and evaluation of aerial photography of the sites. Through the analysis of the aerial photographs and available maps of the study area no obvious heritage sensitive areas were identified inside the study area. Some rocky outcrops that could possibly contain rock engravings and open air stone age sites have been identified as possible heritage sensitive areas. The study area is underlain by stromatolitic carbonate rocks (limestones, dolomites) of Early Precambrian (Archaean) age in outcrops of the Ventersdorp Group. Stromatolites are known to occur within these deposits

	and more modern fossiliferous Caenozoic cave breccias have been recorded associated with carst formation in the dolomite.
Socio-economic	No fatal flaws or contraventions from a socio-economic policy perspective exist for the implementation of the proposed project. The national, provincial, and to some extent local governments, do prioritise the development of renewable energy projects. Although no clear contravention of local policy was identified, it may even be argued that the project will advance the position of Vryburg as a secondary regional centre and primary regional node; it should not interfere with other key development strategies such as the beef beneficiation strategy planned for Vryburg

10.2 Recommendations

Table 79: Outcomes and Recommendations of Specialist Studies

Aspect	Fatal flaws	Site refinement / Recommendations	Further Investigations
Biodiversity	None	The displacement of mobile fauna is considered to be unlikely to be important for this site and project. All other potential impacts should be investigated in the EIA phase or should be assessed using formal methodology.	Yes
Avifauna	None	It is recommended that further data collection is performed entailing at least three site visits over six months to assess the abundance and diversity of priority species at the site. The EIA phase should include a full assessment of the likely impacts and available mitigation options, based on the results of systematic and quantified monitoring.	Yes
Surface water	None	Several potential impacts may affect the surface water resources within the Sendawo Solar PV Facilities' study site where the buildings and associated structures encroach on these sensitive environmental features. It is therefore, provisionally recommended that all PV facilities and associated infrastructure be located outside of any surface water resources as well as to avoid and minimise potential impacts adequately. Detailed studies in the impact phase will however be required to investigate and verify the desktop findings of this report.	Yes

Aspect	Fatal flaws	Site refinement / Recommendations	Further Investigations
Agricultural potential	None	Due to the occurrence of shallow soils, coupled with the extremely hot and dry nature of the climate, it is not anticipated that a detailed soil survey will be required.	Yes, these will be going ahead despite the low likelihood of impacts.
Visual	None	Further assessment will be required in the EIA-phase to investigate the sensitivity of the receptor locations to visual impacts associated with the proposed development and to quantify the impacts that would result.	Yes
Heritage	None	The heritage findings provide the basis for the recommendation of further field truthing through an archaeological walk down, and a full palaeontological impact assessment covering the site. The aim of this will be to compile a comprehensive database of heritage sites in the study areas, with the aim of developing a heritage management plan for inclusion in the Environmental Management Plan as derived from the EIA. To be able to compile a heritage management plan to be incorporated into the Environmental Management Plan the following further work will be required for the EIA. ▪ Archaeological walk through of the areas where the project will be impacting; ▪ Full Palaeontological Impact Assessment, that entails fieldwork and assessment of the potential impacts of the findings of such fieldwork.	Yes, including a full palaeontological impact assessment
Socio-economic	None	The previously listed potential impacts will need to be investigated in the EIA phase in greater detail.	Yes

It is therefore recommended that the following studies be taken through to the EIA Phase:

- Biodiversity (flora and fauna) Assessment (Dr. David Hoare – David Hoare Consulting)
- Avifauna Assessment (Chris van Rooyen - Chris van Rooyen Consulting)
- Surface Water Impact Assessment (Shaun Taylor– SiVEST) – including external peer review by Dr Martin Ferreira – Jeffares and Green
- Soils and Agricultural Potential (D.G. Paterson – ARC Institute for Soil, Climate and Water)

- Visual Impact Assessment (Andrea Gibb – SiVEST) – including external peer review by Keagan Allan – SRK Consulting
- Heritage Assessment (Wouter Fourie – PGS Heritage)
- Palaeontological Assessment (Gideon Groenewald – PGS Heritage)
- Socio-economic Impact Assessment (Mariette Steynberg – Urban-Econ Development Economists)

The proposed scope of work and methodology to assess each of the above impacts has been detailed in the plan of study to undertake an EIA, as per the EIA Regulations. The Plan of Study is included below.

11 PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT

Issues identified during the Scoping phase will be investigated further during the EIA phase of the project. Various specialist studies will be conducted during the EIA phase to assess these issues. Mitigation measures will be formulated and these will be included in the Environmental Management Programme (EMPr).

This information will assist DEA in making an informed decision with regards to the proposed development.

11.1 Aim of the EIA Phase

The aim of the impact assessment phase is to:

- Conduct a detailed impact assessment of the issues identified
- Identify potential mitigation measures to reduce impacts
- Ensure information is disseminated to Interested and / or Affected parties and there is a constant flow of communication

The following tasks will form part of the Environmental Impact Assessment Phase:

- A comprehensive Public Participation Process (as above)
- Conduct specialist studies
- Conduct alternatives assessment on the alternative layouts identified in this DSR
- Compilation of an Environmental Impact Assessment Report (EIAr)
- Compilation of an Environmental Management Programme (EMPr)
- Make Final EIAr available for public comment
- Submit Final EIAr to DEA
- Await decision

The following specialist studies will form part of the EIAr:

- Biodiversity (flora and fauna) Assessment (Dr. David Hoare – David Hoare Consulting)
- Avifauna Assessment (Chris van Rooyen - Chris van Rooyen Consulting)
- Surface Water Impact Assessment (Shaun Taylor– SiVEST) – including external peer review by Dr Martin Ferreira – Jeffares and Green
- Soils and Agricultural Potential (D.G. Paterson – ARC Institute for Soil, Climate and Water)
- Visual Impact Assessment (Andrea Gibb – SiVEST) – including external peer review by Keagan Allan – SRK Consulting
- Heritage Assessment (Wouter Fourie – Professional Grave Solutions)
- Palaeontological Assessment (Gideon Groenewald – PGS Heritage)

- Socio-economic Impact Assessment (Mariette Steynberg – Urban-Econ Development Economists)

The terms of reference for these studies involve assessing the potential impacts that have been identified in the Scoping Report in addition to any new issues that are identified during the detailed assessments. The qualifications of these specialists are included in their CV's which are included in Appendix 2.

11.2 Authority Consultation

The stages at which the competent authority will be consulted are as follows:

- Submission of draft Environmental Impact Assessment Report for comment;
- Submission of final Environmental Impact Assessment Report with comments; and
- Response from competent authority regarding acceptance of final Environmental Impact Assessment Report.

Additional consultation may occur with the DEA during the EIA process should the need arise.

11.3 Proposed Method of Assessing Environmental Issues

The EIA Methodology assists in evaluating the overall effect of a proposed activity on the environment. The determination of the effect of an environmental impact on an environmental parameter is determined through a systematic analysis of the various components of the impact. This is undertaken using information that is available to the environmental practitioner through the process of the environmental impact assessment. The impact evaluation of predicted impacts was undertaken through an assessment of the significance of the impacts.

A brief Terms of Reference for each specialist study is included below:

11.3.1 Biodiversity Assessment

The scoping study provided a general assessment of potential impacts on flora, vertebrate fauna and ecology by the proposed project. The ecological impact assessment will aim to determine potential impacts of the proposed project on the ecological receiving environment.

The general approach that will be adopted for this study will be to identify any critical biodiversity issues that may lead to the decision that the proposed project cannot take place, i.e. to specifically focus on red flags and/or potential fatal flaws. Biodiversity issues will be assessed by documenting whether any important biodiversity features occur on site, including species, ecosystems or processes that maintain ecosystems and/or species. The assessment will be based on a combination of desktop studies, field-based studies and detailed mapping from aerial photographs.

During the scoping study a description and characterisation of the broad study area was undertaken. A description of the receiving environment was provided and any major sensitivities within the study area were identified. Potential impacts on biodiversity, sensitive habitats and ecosystem function were listed and described.

During the EIA phase the study area will be visited and assessed in order to confirm patterns identified from the desktop assessment. Specific features of potential concern will be investigated in the field, including the following:

- General vegetation status;
- Presence of habitats of conservation concern;
- Presence of protected trees;
- Potential presence of species of concern.

The EIA phase will also consider an assessment of alternatives and the cumulative impacts associated with other renewable energy projects in the area.

Impacts identified from the Scoping (Desktop) Phase will be assessed according to standard criteria (nature, extent, duration, magnitude, probability, significance, status as well as the degree to which impacts can be reversed, the degree to which impacts will cause irreplaceable loss of resources and the degree to which impacts can be mitigated).

11.3.2 Avifauna Assessment

For purposes of the EIA phase of the study, the following methods will be employed:

- The study area will be inspected and the avifaunal habitat classes will be recorded and described.
- Transect counts will be conducted to establish the abundance and variety of priority avifauna at the site to supplement the existing SABAP2 data.
- The existing high-voltage power lines in the study area will be inspected for breeding raptors.

- The potential impacts will be assessed according to the prescribed assessment methods and mitigation measures will be proposed.

The Birds and Renewable Energy Specialist Group (BARESG), convened by BirdLife South Africa and the Wildlife and Energy Programme of the Endangered Wildlife Trust, proposes the following guidelines and monitoring protocols for evaluating utility-scale solar energy development proposals:

- Initial screening or scoping – an initial assessment of the likely avifauna and possible impacts, preferably informed by a brief site visit and by desk-top collation of available data; also including the design of a site-specific survey and monitoring project should this be deemed necessary. This was done during the scoping phase, see avifaunal specialist report in Appendix 6B.
- Data collection – further accumulation and consolidation of the relevant avian data, possibly including the execution of baseline data collection work as specified by the scoping study, intended to inform the avian impact study. In this instance, it is recommended that further data collection is performed entailing at least three site visits over six months to assess the abundance and diversity of priority species at the site.
- Impact assessment - a full assessment of the likely impacts and available mitigation options, based on the results of systematic and quantified monitoring if this was deemed a requisite at scoping. This will form part of the final bird impact assessment report.
- Monitoring and mitigation – repetition of baseline data collection, plus the collection of mortality data. This helps to develop a complete before and after picture of impacts, and to determine if proposed mitigation measures are implemented and are effective, or require further refinement. The extent of the post-construction monitoring will be informed by the results of the pre-construction monitoring.

Avifaunal monitoring of the Sendawo site has already started and will continue into the EIA phase. The results of the monitoring will be included in the DEIAr.

11.3.3 Surface Water Impact Assessment

The surface water assessment during the EIA phase would primarily entail more detailed field investigation of surface water bodies (identified during the scoping phase) within the project site.

The fieldwork would be focused on:
- Larger wetland and drainage systems;
- Those wetland systems identified as sensitive or as having a high functionality; and
- Riparian zones of larger river systems.

The primary aim of the EIA-level assessment would be to determine the boundaries of the relevant wetland / riparian systems so that the solar PV energy facility can be placed outside of the wetlands / riparian areas. The wetland / riparian area boundary delineation would be undertaken using the DWAF guideline ‘A practical field procedure for the identification and delineation of wetlands and riparian areas’.

The surface water analysis would propose measures to mitigate any identified potential negative impacts associated with the solar PV energy facility, and these would inform the EMPr phase. Mitigation measures would possibly entail slight changes to the proposed locations and extent of the solar PV energy facility to avoid impacts on surface water bodies, where significant or likely impacts have been predicted.

Input will be given to the proposed layout and buffers recommended.

The study will culminate in the compilation of a Surface Water Impact Assessment as well as mitigation measures which will feed into the Environmental Management Programme (EMPr).

The Surface Water Impact Assessment Report will be peer reviewed by an external surface water specialist and the report will be updated based on the peer reviewers' comments prior to finalisation.

11.3.4 Soils and Agricultural Potential Assessment

A full agricultural assessment during the EIA Phase will encompass the following:

- More detailed assessment of soil conditions

  The EIA phase assessment will include a field investigation of soils and agricultural conditions across the site. This field investigation will be aimed at ground proofing the existing land type information and understanding the specific soil and agricultural conditions on site. It will not be based on a grid spacing of test pits but will comprise a reconnaissance type of soil mapping exercise based on an assessment of surface conditions, topography, and hand augered samples in strategic places, if necessary. Such a soil investigation is considered adequate for the purposes of this study. A more detailed soil investigation is not considered likely to add anything significant to the assessment of agricultural soil suitability for the purposes of determining the impact of the development on agricultural resources and productivity.

- Assessment of erosion and erosion potential on site

  The field investigation will involve a visual assessment of existing erosion and erosion potential on site, taking into account the proposed development layout.

- Assessment of the impacts of specific construction activities and layout on soil conditions

  The EIA phase will include an assessment of the specifics of construction activities and the proposed development layout on potential loss of topsoil.

- Assessment of specific on-site agricultural activities

The EIA phase will gather more detail on agricultural activity on the site and identify any locally important soil and agricultural issues.

The study will culminate in the compilation of an Agricultural Impact Assessment as well as mitigation measures which will feed into the Environmental Management Programme (EMPr).

11.3.5 Visual Impact Assessment

The focus of the EIA phase VIA will be to undertake a more detailed GIS-based assessment, to quantify the magnitude and significance of the visual impacts of the proposed development in both a day-time and night-time context.

This assessment will focus on areas where potential sensitive receptors are located. Should data be available, digital terrain models will be generated for the areas of focus. This analysis will be conducted using the ArcView 10, Spatial Analyst and 3D Analyst extensions where necessary. The assessment will rely on site visits to each potentially sensitive receptor location to identify the extent of visual impact of the proposed PV plant facilities from the potentially sensitive locations. A further assessment of the intensity of potential visual impact, expressed in terms of bands of differing visual significance will be undertaken. The fieldwork will also allow for the correction and refinement of the baseline information.

The overall significance of visual impacts associated with the proposed PV facility will be assessed through a rating matrix. Once this has been undertaken, measures to mitigate potential visual impacts will be identified, and if practical, layout alternatives within the application site will be considered and suggested to minimise visual impact of the proposed development.

A separate rating matrix will be used to assess the visual impact of the proposed development on the sensitive receptor locations, as identified. This matrix is based on the distance of a receptor from the proposed development, the primary focus / orientation of the receptor, the presence of screening factors, the visual character and sensitivity of the area and the visual contrast of the development with the typical elements and forms in the landscape.

Thereafter, the alternatives will be comparatively assessed, in order to ascertain the preferred alternative from a visual perspective.

Interested and Affected Parties will be consulted through the public participation process being undertaken as part of the EIA process, in order to establish how the proposed PV facility will be perceived from the various receptor locations and the degree to which this impact will be regarded as negative.

It is envisaged that the main deliverable of the study would be the generation of a spatial databases / maps indicating the zones of visual impact, as well as a detailed report indicating the findings of the study.

The Visual Impact Assessment Report will be peer reviewed by an external visual specialist and the report will be updated based on the peer reviewers' comments prior to finalisation.

11.3.6 Heritage Assessment

The Heritage Impact Assessment (HIA) report to be compiled by PGS Heritage (PGS) for the proposed Sendawo Solar project will assess the heritage resources found on site. This report will contain the applicable maps, tables and figures as stipulated in the NHRA (no 25 of 1999) and the National Environmental Management Act (NEMA) (no 107 of 1998). The HIA process consists of three steps:

- Step I – Literature Review: The background information to the field survey leans greatly on the Heritage Scoping Report completed by PGS for this site.

- Step II – Physical Survey: A physical survey will be conducted on foot through the proposed project area by qualified archaeologists, aimed at locating and documenting sites falling within and adjacent to the proposed development footprint.

- Step III – The final step involves the recording and documentation of relevant archaeological resources, as well as the assessment of resources in terms of the heritage impact assessment criteria and report writing, as well as mapping and constructive recommendations

The significance of heritage sites is based on four main criteria:

- **site integrity** (i.e. primary vs. secondary context),
- **amount of deposit, range of features** (e.g., stonewalling, stone tools and enclosures),
    - Density of scatter (dispersed scatter)
        - Low - <10/50m^2
        - Medium - 10-50/50m^2
        - High - >50/50m^2
- **uniqueness** and
- **potential** to answer present research questions.

Management actions and recommended mitigation, which will result in a reduction in the impact on the sites, will be expressed as follows:

A - No further action necessary;
B - Mapping of the site and controlled sampling required;
C - No-go or relocate pylon position
D - Preserve site, or extensive data collection and mapping of the site; and
E - Preserve site

Site Significance

Site significance classification standards prescribed by the South African Heritage Resources Agency (2006) and approved by the Association for Southern African Professional Archaeologists (ASAPA) for the Southern African Development Community (SADC) region, were used for the purpose of this report.

Table 80: Site significance classification standards as prescribed by SAHRA

FIELD RATING	GRADE	SIGNIFICANCE	RECOMMENDED MITIGATION
National Significance (NS)	Grade 1	-	Conservation; National Site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; Provincial Site nomination
Local Significance (LS)	Grade 3A	High Significance	Conservation; Mitigation not advised
Local Significance (LS)	Grade 3B	High Significance	Mitigation (Part of site should be retained)
Generally Protected A (GP.A)	Grade 4A	High / Medium Significance	Mitigation before destruction
Generally Protected B (GP.B)	Grade 4B	Medium Significance	Recording before destruction
Generally Protected C (GP.A)	Grade 4C	Low Significance	Destruction

11.3.7 Socio-economic Impact Assessment

A socio-economic impact assessment will be conducted during the EIA phase in order to:

- Delineate the zone of influence that stretches beyond the directly affected sites following the discussions with other specialists on the team
- Collect primary socio-economic data (through personal or telephonic interviews) of the communities and economic activities that will be directly or indirectly affected (positively or negatively) by the proposed developments (per project and its components)
- Quantify the potential positive and negative effects of the proposed project and its alternatives (if applicable) on the socio-economic environment in the delineated study area;
- Evaluate the change in the size and composition of the local and regional economies that will be stimulated by the proposed development, as well as the state of local communities
- Evaluate the potential positive and negative impacts following the environmental specialist's methodology
- Assess cumulative impacts
- Develop a management and mitigation plan by proposing mitigation measures for negative effects and enhancement measures for positive impacts, supported by methods for the implementation, timeframes, costs and responsibilities information

The following methods will be employed in undertaking the study.

- Surveys and interviews

  Surveying is one of the fastest ways to obtain primary information. Surveys can be conducted over the telephone, internet, e-mail, or personal interviews. The latter is relatively expensive but since it involves one person interviewing another, it is a way to get in-depth and comprehensive information. The use of surveys and interviews is particular applicable for collecting primary data of the community that could potentially be affected by the project or collecting specific data from an identified official or stakeholder.

  The following data will be sourced using surveys and interviews:
    - Land use information and type of economic activity on properties within the affected environment
    - Economic profiles of the activities within the affected environment
    - Demographic and social characteristics of the local environment (population, income levels, crime levels, etc.)

- Mapping

  Land use mapping technique would be used to illustrate and analyse the land uses in the affected area. The map will be created based on the information collected during the surveys and include the following data:
    - Types and location of tourism facilities in the area
    - Land uses in the area surrounding the facility (defined by the visual impact)

- Economic modelling and impact assessment

  Assessment of economic impacts will be done using economic models developed for the South African economy and the North West Province. The former will be used to assess the impacts on the country's economy, whilst the latter will be used to estimate the impact on the provincial and local economies.

  Economic models are compiled on the basis of Social Accounting Matrices that illustrate the linkages between various economic agents. The use of economic models allows identifying the industry-specific multipliers on production, capital formation, Gross Domestic Product (GDP), employment, and income. Such multipliers can also be broken in terms of various effects that can be observed as a result of an exogenous change introduced into the economy, be it capital investment or operating expenditure. Three types of effects are distinguished, inter alia:
    - Direct – these represent the original purchases for the project's establishment or operations
    - Indirect – these are effects that spill over the industries that supply goods and services required for the implementation of the project or for its operation, whether directly to the contractor or operator, or through their suppliers

- Induced – these are the effects that are stimulated by the change in income levels of households that would directly or indirectly be affected by the project and businesses.

11.4 Cumulative Impact Assessment

The potential cumulative impact of the proposed solar facility in combination with other renewable energy facilities in the area will be identified and assessed per environmental aspect and mitigation measures will be identified to address the cumulative impact, where possible. Cumulative impacts will also be rated as part of the impact rating system and used to determine the significance of the impacts.

11.5 Determination of Significance of Impacts

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e. site, local, national or global whereas Intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table 82.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

11.6 Impact Rating System

Impact assessment will take account of the nature, scale and duration of effects on the environment whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact will also be assessed according to the project stages:

- Planning;
- Construction;
- Operation; and
- Decommissioning.

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

11.6.1 Rating System Used To Classify Impacts

The rating system will be applied to the potential impact on the receiving environment and includes an objective evaluation of the mitigation of the impact. Impacts will be consolidated into one rating. In assessing the significance of each issue the following criteria (including an allocated point system) is used:

Table 81: Description of terms.

NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	International and National	Will affect the entire country
2	Province/region	Will affect the entire province or region
3	Local/district	Will affect the local area or district
4	Site	The impact will only affect the site
PROBABILITY		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Irreversible	The impact is irreversible and no mitigation measures exist.

2	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
3	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
4	Completely reversible	The impact is reversible with implementation of minor mitigation measures
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
DURATION		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity		
1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts on the environmental parameter. A cumulative effect/impact is an effect which in itself may not be significant but may become significant if added		

to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible Cumulative Impact	The impact would result in negligible to no cumulative effects
2	Low Cumulative Impact	The impact would result in insignificant cumulative effects
3	Medium Cumulative impact	The impact would result in minor cumulative effects
4	High Cumulative Impact	The impact would result in significant cumulative effects
INTENSITY / MAGNITUDE		
Describes the severity of an impact		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
SIGNIFICANCE		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula: **(Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.**		

The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.		
Points	**Impact Significance Rating**	**Description**
6 to 28	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive Low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive Medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive High impact	The anticipated impact will have significant positive effects.
74 to 96	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive Very high impact	The anticipated impact will have highly significant positive effects.

The table below is to be represented in the Impact Assessment section of the report.

Table 82: Rating of impacts.

IMPACT TABLE	
Environmental Parameter	*A brief description of the environmental aspect likely to be affected by the proposed activity e.g. Surface water*
Issue/Impact/Environmental Effect/Nature	*A brief description of the nature of the impact that is likely to affect the environmental aspect as a result of the proposed activity e.g. alteration of aquatic biota The environmental impact that is likely to positively or negatively affect the environment as a result of the proposed activity e.g. oil spill in surface water*
Extent	*A brief description indicating the chances of the impact occurring*
Probability	*A brief description of the ability of the environmental components recovery after a disturbance as a result of the proposed activity*

IMPACT TABLE		
Reversibility	*A brief description of the environmental aspect likely to be affected by the proposed activity e.g. Surface water*	
Irreplaceable loss of resources	*A brief description of the degree in which irreplaceable resources are likely to be lost*	
Duration	*A brief description of the amount of time the proposed activity is likely to take to its completion*	
Cumulative effect	*A brief description of whether the impact will be exacerbated as a result of the proposed activity*	
Intensity/magnitude	*A brief description of whether the impact has the ability to alter the functionality or quality of a system permanently or temporarily*	
Significance Rating	*A brief description of the importance of an impact which in turn dictates the level of mitigation required*	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	4	1
Probability	4	1
Reversibility	4	1
Irreplaceable loss	4	1
Duration	4	1
Cumulative effect	4	1
Intensity/magnitude	4	1
Significance rating	-96 (high negative)	-6 (low negative)
Mitigation measures	*Outline/explain the mitigation measures to be undertaken to ameliorate the impacts that are likely to arise from the proposed activity. Describe how the mitigation measures have reduced/enhanced the impact with relevance to the impact criteria used in analysing the significance. These measures will be detailed in the EMPR.*	

11.7 Environmental Management Programme (EMPr)

In accordance with the EIA Regulations, 2014 a draft Environmental Management Programme (EMPr) will be included within the Environmental Impact Assessment Report. The EMPr will include the mitigation measures formulated by the various specialists.

11.8 Alternative Assessment

In accordance with the EIA Regulations, 2014 and as discussed in Chapter 7 of this report, all the layout alternatives identified within this DSR will be described and comparatively assessed in the EIA phase. These will be adjusted based on more detailed specialist studies. These layouts are presented in **Figure 25** and **Figure 26**, and they include the following:

- Two (2) alternative sites for the substation
- Two (2) alternative sites for the O&M buildings
- Two (2) alternative sites for the laydown areas

As previously stated, the sensitive areas used to determine the layouts were based on desktop studies, specialist studies in the EIA phase will provide a more detailed assessment of sensitive areas. If necessary, the layout will be amended at this stage to more accurately avoid highly sensitive or no-go areas.

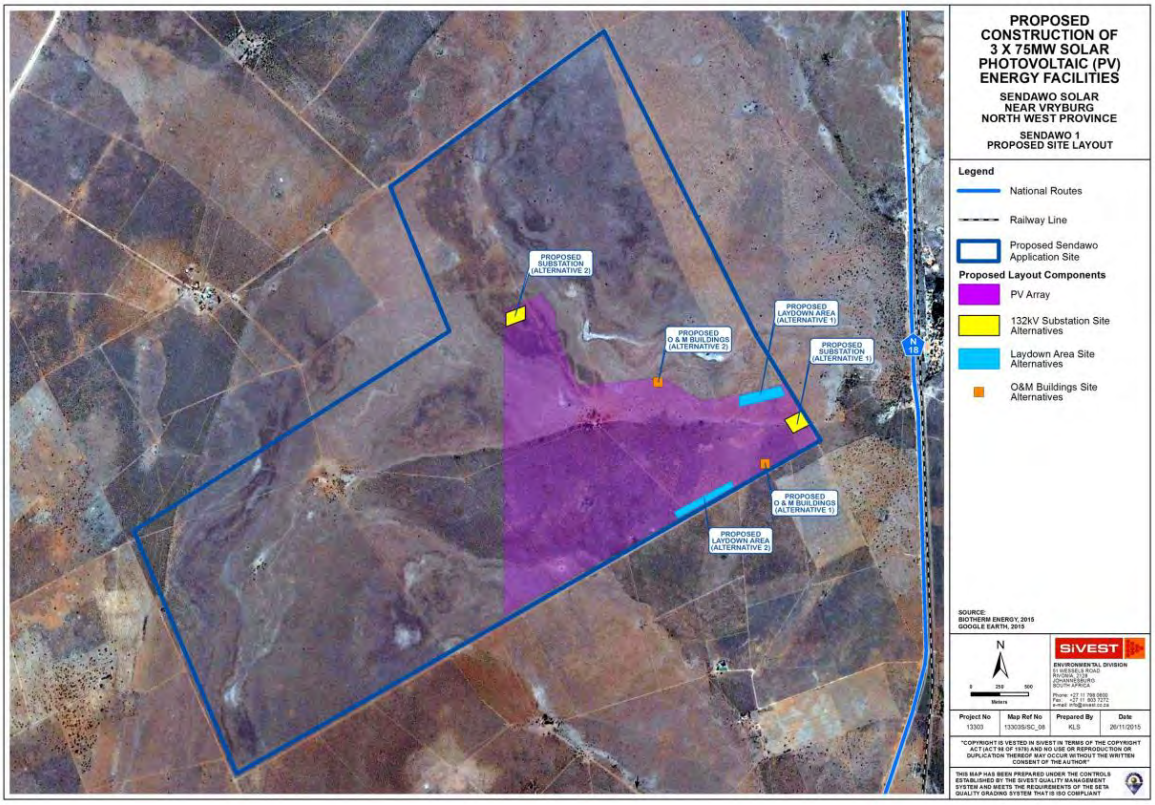

Figure 25: Proposed Layout Alternatives

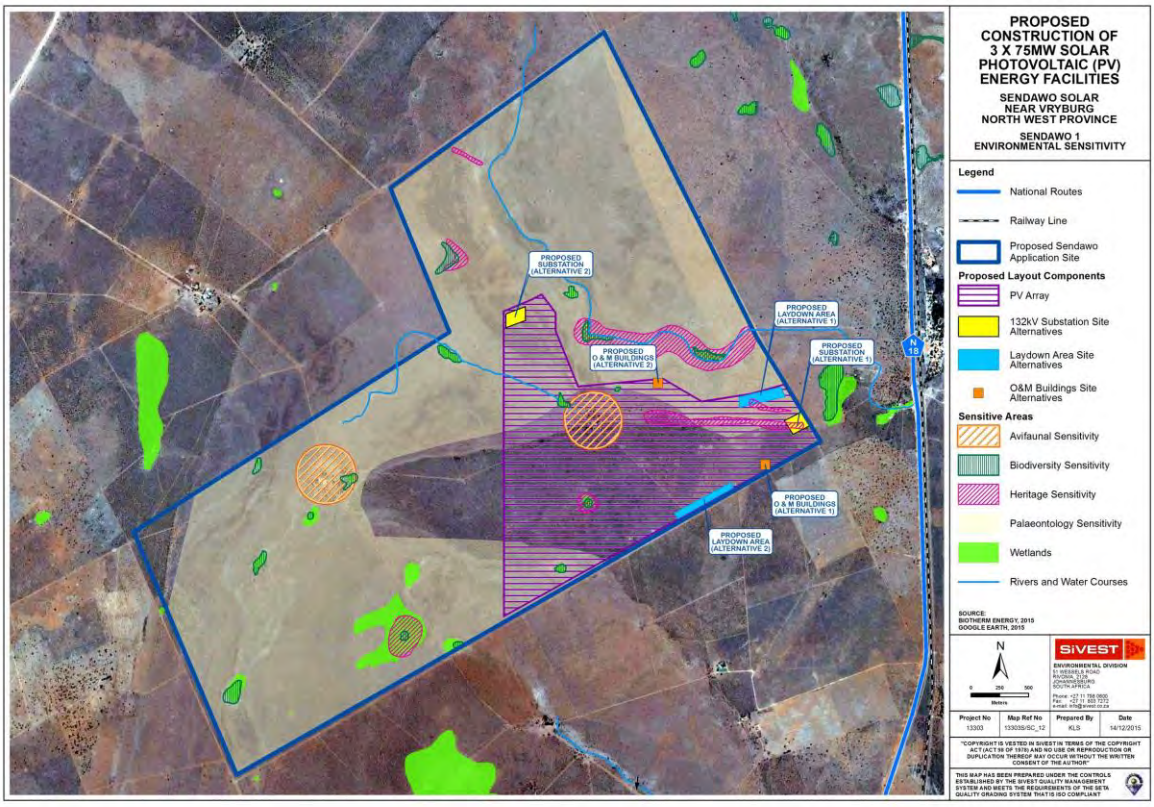

Figure 26: Proposed Layout Alternatives in relation to the Sensitive Areas

11.9 Recommendations

It is recommended that the specialist studies pertaining to certain aspects be carried forward into the EIA Phase, namely, those studies mentioned above. Various issues and concerns have been identified which require detailed assessment and thus it is recommended that the EIA phase be allowed to continue in order to assess these and the impacts associated.

11.10 Public Participation

The Public Participation during the EIA Phase will involve the following:

Table 83: Public Participation activities still to take place.

ACTIVITY	FUNCTION
Prepare and distribute EIA newsletter	Notify registered I&APs of outcome of the Scoping Phase (including timeframes and when their input is required).

ACTIVITY	FUNCTION
Focus Group Meeting	Meeting to provide feedback on the findings of the DEIAr to key stakeholders (specifically the Local and District Municipalities and Landowners)
Public Meetings	Provide feedback on the findings of the DEIAr to the general public.
Public comment period	Notification of I&APs of the availability of the EIAr reports for public comment.
Notification of granting or refusal of Environmental Authorisation	Informing of all registered I&APs of the EA
Environmental Authorisation appeal period	Receive any appeals and forward to DEA

11.11 Proposed Project Schedule going forward

The table below represents the proposed schedule of events for the project till closure upon DEA's decision.

Table 84: Proposed Project Schedule

	January 2016	February 2016	March 2016	May 2016	June 2016	September 2015
Start of DSR Comment period	Dates to be confirmed in the impact phase					
Submission of FSR to DEA		Dates to be confirmed in the impact phase				
DEA Decision on FSR			Dates to be confirmed in the impact phase			
Distribution of EIA Newsletter			Dates to be confirmed in the impact phase			
DEIR Comment period				Dates to be confirmed in the impact phase		
Hold Meetings (FGMs and PM)				Dates to be confirmed in the impact phase		
Submission of FEIR to DEA					Dates to be confirmed in the impact phase	
DEA Decision						Dates to be confirmed in the impact phase

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