ENVIRONMENTAL IMPACT ASSESSMENT FOR THE INSTALLATION OF A SOLAR PHOTOVOLTAIC POWER PLANT AT ESKOM ARNOT POWER STATION

FINAL SCOPING REPORT
DEA REFERENCE NUMBER 14/12/16/3/3/2/760

April 2015

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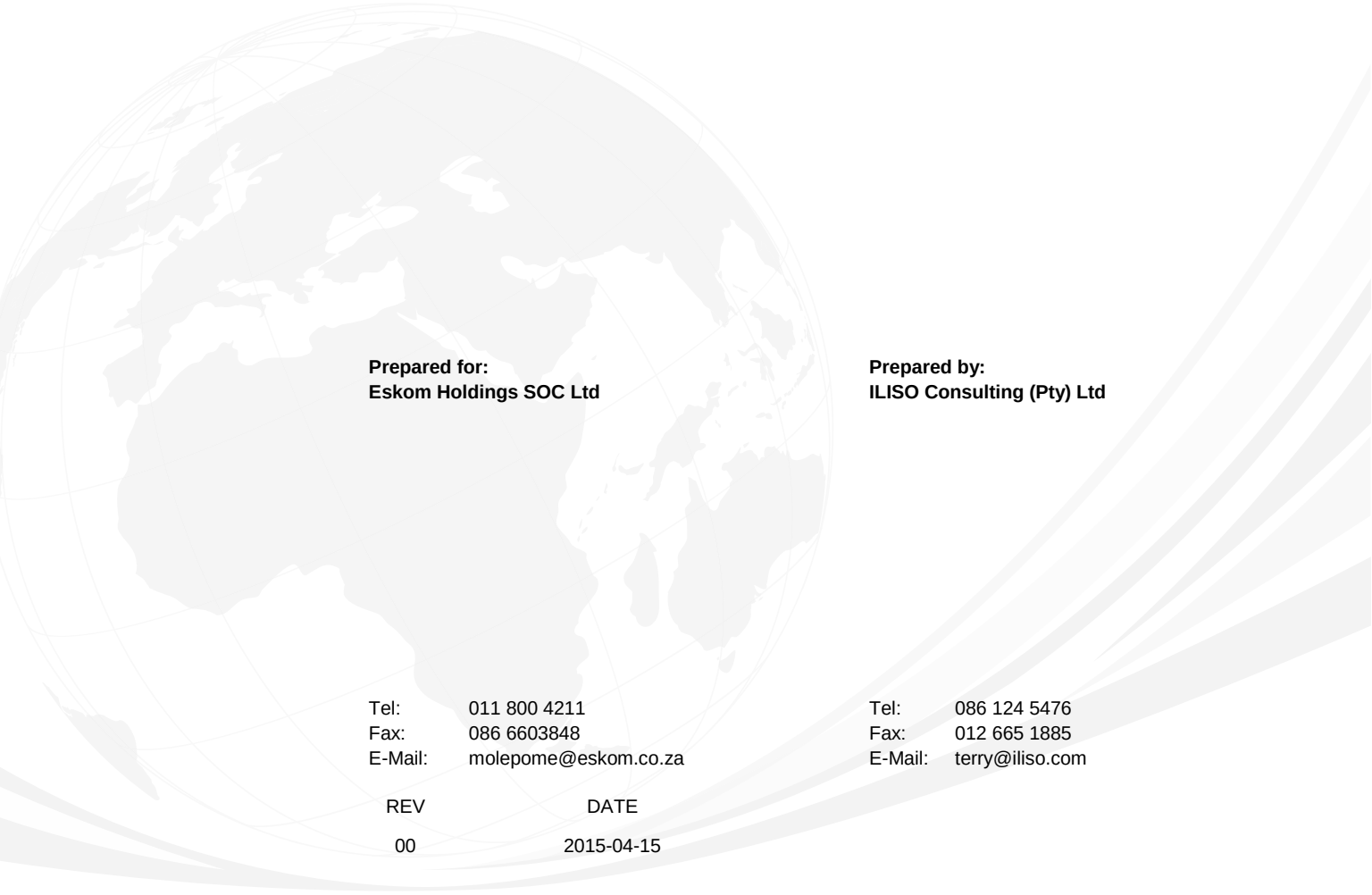

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EXECUTIVE SUMMARY

1. INTRODUCTION

Eskom Holdings SOC Limited (Eskom), proposes to construct and operate a PV plant on the property of the existing Eskom Arnot Power Station, located on the farm Rietkuil 491JS in Mpumalanga. The Arnot Power Station is located approximately 50 km east of Middelburg and forms part of the Steve Tshwete Local Municipality (STLM). The STLM is situated at the center of Nkangala District Municipality (NDM). The required installation site for the PV plant has a footprint of 25.8 ha and has a projected power peak of 17.2 MWp.

ILISO Consulting (Pty) Ltd. was appointed to undertake the necessary environmental process as required in terms of the National Environmental Management Act (No. 107 of 1998) (NEMA), as amended, on behalf of Eskom. This report serves to document the Scoping Phase of the Environmental Impact Assessment (EIA) process in terms of 2010 EIA Regulations.

2. PROJECT DESCRIPTION

The installation of the proposed PV plant on the property of Eskom's Arnot power Station includes a solar field and associated infrastructure. The solar field will consist of solar panels and will require a Substation; Metrological station; Control and Operation Buildings. Existing access roads will be upgraded and new internal roads will be constructed to gain access to the solar field and associated infrastructure.

3. NEED AND DESIRABILITY

The NDM has published an extensive Integrated Development Plan (IDP) which identifies the need to look toward renewable energy. Even though the proposed project will be used for Eskom's own consumption at Arnot Power Station, it will allow Eskom to increase its electricity export to the grid. In doing so, this will enable Eskom to support the demand side management energy efficiency programme and contributes to South Africa being able to meet some of its international obligations, by aligning domestic policy with internationally agreed strategies and standards.

4. ALTERNTAIVES

Originally nine (9) areas, on land belonging to Eskom, surrounding the Arnot Power Station were identified for possible development. During the Screening exercise six (6) of these were eliminated as either being too small or too close to the coal deposits and wetlands. Details of the three (3) remaining alternatives were considered in this report. These are referred to as Site 1; Site 3 and Site 4.

- ***Alternative Site 1***
  Alternative Site 1, as per the Power Station Site Screening Report (Arup, 2013), has a footprint of 25.8 ha allowing for a projected power peak of 17.2 MWp. It is situated on Eskom owned property and can be characterised has having a fairly flat topography. There is a suitable electrical point of connection for the PV

plant within the power station at the 11 kV station boards. The approximate distance to the point of connection is 2 km from the station.

- ***Alternative Site 3***

  Alternative Site 3 has a footprint of 14.4 ha allowing for a projected power peak of 9.6 MWp. This is a smaller land area which will only trigger a basic assessment process. The proximity to a wetland will be further investigated during the EIA phase. The approximate distance to the point of connection is 2.2 km from the station.

- ***Alternative Site 4***

  Alternative Site 4 has a footprint of 32.6 ha allowing for a projected electricity output of 21.7 MWp. The site is outside of the immediate power station security fence, and has flat topography. The approximate distance to the point of connection is 1.5 km from the station.

  Following the public comment period Eskom Arnot power Station can no longer avail the land designated as Alternative Site 4. This alternative will therefore not be considered and assessed in the EIA phase. Only Alternative sites 1 and 3 will be further assessed.

5. DESCRIPTION OF THE RECEIVING ENVIRONMENT

South Africa experiences some of the highest levels of solar radiation in the world. The average daily solar radiation in South Africa varies between 4.5 and 6.5 kWh/m^2. The study area displays warm summers and cold winters typical of the Highveld climate. The average summer and winter daytime temperatures are 25 ^{0}C and 20 ^{0}C, respectively. Rainfall occurs mainly as thunderstorms and drought conditions occur in approximately 12 % of all years. The Environmental Potential Atlas for Mpumalanga Province places rainfall at site as ranging between 621 mm and 750 mm per year. The prevailing wind direction is north-west during the summer and east during winter. Winds are usually light to moderate.

The study area is underlain by geology consisting of the Karoo Supergroup which consists of sedimentary and basalt rocks. It is a relatively young plateau system that is in the slow process of being removed by erosion from the sub-Karoo surface. The study area falls within the Mesic Highveld Grassland Bioregion (Mucina and Rutherford, 2006).

6. PUBLIC PARTICIPATION IN THE SCOPING PHASE

A letter notifying I&APs of this application for environmental authorisation, was sent to all registered stakeholders together with a Background Information Document (BID). An on-site notice, providing a brief background on the project and contact details in order for I&APs to request further information and/or to register as a stakeholder was posted on the 16th January 2015 at the Arnot Power Station and Rietkuil Country Club In addition hand deliveries of BIDS and Notification letters were undertaken around the Arnot Power Station.

Notice of the application was advertised in the Middelburg Observer on the 9th January 2015. The draft scoping report was available to I&APs for comment on the ILISO website (www.iliso.com) and hard copies were made available for perusal at the, Arnot Power Station security gate and environmental office as well as the Rietkuil Country Club. I&APs had thirty (30) days to comment on the draft scoping report. The comment period was from the 25th February 2015 to the 26th March 2015.

Public meetings were held during the scoping phase to provide stakeholders with background information, about the proposed project and to give them the opportunity to raise issues and/or concerns that need to be addressed during the project. The meetings were held on the 12th March 2015 at the Rietkuil Country Club at 10:00 am and 17:00 pm to allow for all I&AP to contribute in the public participation process. No I&APs were in attendance at both meetings. All comments received during the comment period are recorded in the Issues and Responses Report (IRR)

7. PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT

The EIA will build on the Scoping report and will focus on assessing the key impacts, determining their significance, and recommending appropriate measures to mitigate negative impacts and enhance benefits. The contents of the Environmental Impact Report (EIR) will be as prescribed in the EIA Regulations, 2010 (Regulation 31(2)).

8. SPECIALIST STUDIES

Some of the key issues identified during the Scoping Phase will require further investigation by appropriately qualified and experienced specialists. The specialist studies to be undertaken during the EIA phase will be synthesised and integrated into the overall impact assessment (full reports will be included as appendices to the EIR), and recommendations for mitigation will be included in the Environmental Management Programme (EMPr). The contents of all specialist reports will include information as prescribed in Regulation 32(3) of the EIA Regulations, 2010. The following Specialist Studies will be undertaken to provide preference ranking of the sites:

- ***Flora and Fauna Assessment***
  The assessment will include desktop studies and site specific field work. Input on faunal and floral components for the scoping report, which is to include the findings of the data from the desktop study as well as the initial site visit, including comments with respect to spatial integrity and importance, species richness, biodiversity value of the areas and proposed management actions with respect to sensitive areas and/or species. Extensive consideration will be given to determining the Ecological Importance and Sensitivity (EIS) of the development according to the Biodiversity Geographical Information Systems (BGIS), any national or provincial fine scale plans applicable to the region as well as the National Spatial Biodiversity Assessment (NSBA).

- ***Avifaunal Assessment;***
  The Avifaunal assessment will include desktop studies and site specific field work. Distribution and preferred habitat of avifaunal species will also be noted. Taxa specific lists will also be compiled with the use of databases such as SABCA Coordinated Avifaunal Road count (CAR) data and SABAP. Attention will also be afforded to EIA reports and any subsequent monitoring reports on the potential impacts on birds.

- ***Wetland Assessment***
  A desktop study will be compiled with all relevant information as presented by the SANBI's BGIS website (http://bgis.sanbi.org) as well as the location of Freshwater Ecosystem Priority Areas (FEPAs) in relation to the study area. A site assessment will be undertaken and wetland features identified within the study area assessed.

- ***Heritage Impact Assessment***
  The Heritage Impact Assessment (HIA) will be undertaken in compliance with Section 38 of the National Heritage Resources Act No. 25 of 1999 and include an investigation into all heritage resources, including Palaeontological sites, and recommendations for their management.

- ***Soils and agricultural potential Assessment***
  The soils and agricultural potential study will entail a desktop study using a 1:250 000 land type information. The specialist will conduct an impact assessment and recommend mitigation measures to minimise any negative impacts and enhance positive impacts.

- ***Social Impact Assessment***
  The objective of the Social Impact Assessment (SIA) is to identify the social baseline conditions in which the proposed project will take place. Against this background, and based on the project description, the purpose is also to identify, assess and mitigate the likely social impacts that may occur as a result of the proposed project.

9. CONCLUSION

The main aim of the proposed PV plant at Eskom's Arnot Power Station is to enable Eskom to diversify their energy mix and reduce their carbon footprint. Even though the proposed project will be used for Eskom's own consumption at Arnot Power Station it will allow Eskom to increase its electricity export to the grid. In doing so, this will enable Eskom to support the demand side management energy efficiency programme and contribute to South Africa being able to meet some of its international obligations, by aligning domestic policy with internationally agreed strategies and standards.

As per the requirements of NEMA, this scoping investigation has reviewed project alternatives and highlighted the potential environmental impacts associated with the proposed installation of the PV Plant. Environmental impacts of the project have been identified and will be further investigated and assessed in the EIA phase.

The project team has the necessary experience and skills to carry out the EIA process (including specialist studies) and it is recommended that the EIA process proceeds based on the proposed Plan of Study for the EIA.

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LIST OF ACRONYMS

AC	Alternating Current
BA	Basic Assessment
BSc	Bachelor of Science
BID	Background Information Document
BGIS	Biodiversity Geographical Information Systems
CA	Competent Authority
CMS	Catchment Management Strategy
DC	Direct Current
DEA	Department of Environmental Affairs
DME	Department of Mineral and Energy
DMR	Department of Mineral Resources
DoE	Department of Energy
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EIS	Ecological Importance and Sensitivity
Eskom	Eskom Holdings SOC Limited
EMPr	Environmental Management Programme
ERA	Energy Regulation Act 2006 (4 of 2006)
FEPAs	Freshwater Ecosystem Priority Areas
GDS	Growth and Development Strategy
GHG	Green House Gas
GIS	Geographical Information System
GLeWaP	Groot Letaba Water Project
GN	Government Notice
GPS	Global Positioning System
HIA	Heritage Impact Assessment
IAIA	International Association of Impact Assessment
IAIAsa	International Association of Impact Assessment South Africa
I&AP	Interested and Affected Parties
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IEP	Integrated Energy Plan
ILISO	ILISO Consulting (Pty) Ltd
IPP	Independent Power Producer
IRR	Issues and Responses Report
IRP	Integrated Resource Plan
ISO	International Standards Organisation
IUCN	International Union for Conservation of Nature
MSA	Municipal Systems Act 2000 (32 of 2000)
MTSF	Medium Term Strategic Framework
MTEFs	Medium Term Expenditure Frameworks
NDM	Nkangala District Municipality
NEMA	National Environmental Management Act 1998 (107 of 1998)

NEMBA	National Environmental Management Biodiversity Act 2004 (10 of 2004)
NERSA	National Energy Regulator of South Africa
NFSD	National Framework for Sustainable Development
NHRA	National Heritage Resource Act 25 of 1999
NIRP	National Integrated Resource Plan
NSBA	National Spatial Biodiversity Assessment
NSDP	National Spatial Development Plan
PES	Present Ecological Sensitivity
PGDSs	Provisional Growth Development Strategies
PoS	Plan of Study
PPP	Public Participation Process
PV	Photovoltaic
RDL	Red Data Lists
SACLAP	South African Council for the Landscape Architectural Profession
SACNSP	South African Council for Natural Scientific Professionals
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANCOLD	South African Committee on Large Dams
SDF	Spatial Development Framework
SEF	Solar Energy Facility
SIAs	Social Impact Assessments
STLM	Steve Tshwete Local Municipality
WUL	Water Use License

ABBREVIATIONS

CO_2	Carbon Dioxide
CH_4	Methane
CFC's	Chlorofluorocarbons
GWh	Gigawatt hour
km	Kilometer
km^2	Square Kilometers
KWh/m^2	Kilowatt-hour per meter squared
MWp	Mega Watt peak
m	Meters
ha	Hectare
°C	Degrees Celsius
%	Percentage
PAN	Peroxyacylnitrate

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE INSTALLATION OF A SOLAR PHOTOVOLTAIC POWER PLANT AT ESKOM'S ARNOT POWER STATION
FINAL SCOPING REPORT

1. INTRODUCTION

South Africa experiences some of the highest levels of solar radiation in the world with the average daily varying between 4.5 and 6.5 kWh/m^2 (DoE,Web 2). Eskom Holdings SOC Limited (Eskom) proposes to construct and operate a Solar Photovoltaic (PV) plant within the property of Eskom's Arnot Power Station located in the Mpumalanga Province. The proposed installation site for the PV plant has a footprint of 25.8 ha and has a projected power peak of 17.2 MWp.

ILISO Consulting (Pty) Ltd, (ILISO) was appointed to undertake the necessary environmental process as required in terms of the National Environmental Management Act (No. 107 of 1998) (NEMA), as amended, on behalf of Eskom. This report serves to document the Scoping Phase of the Environmental Impact Assessment (EIA) process in terms of the 2010 Regulations.

1.1 PROJECT LOCATION

Eskom, proposes to construct and operate a PV plant on the property of the existing Eskom Arnot Power Station, located on the farm Rietkuil 491JS in Mpumalanga. The Arnot Power Station is located approximately 50 km east of Middelburg and forms part of the Steve Tshwete Local Municipality (STLM). The STLM is situated at the center of Nkangala District Municipality (NDM) and covers a geographical area of approximately 3,976 km^2**.** The towns and settlements within the Municipality include Middelburg, Mhluzi, Hendrina, Kwazamokuhle, Rietkuil, Pullenshope, Komati, Presidentsrus, Naledi, Lesedi, Kranspoort, Blinkpan, Koornfontein, Kwa-Makalane and Doornkop. **Table 1** provides details regarding the project location.

Table 1: Project Location

Province	Mpumalanga
District Municipality	Nkangala District Municipality
Local Municipality	Steve Tshwete Local Municipality
Ward number(s)	7
Nearest town(s)	Rietkuil
Farm name(s) and number(s)	Rietkuil 491JS
Portion number(s)	Remainder of Portion 24
21 digit Surveyor General Code	T0JS00000000049100024

1.2 DESCRIPTION OF THE PROPOSED PROJECT

The proposed installation site for the PV facility requires a footprint of 25.8 ha and has a projected power peak of 17.2 MWp **(Figure 1).**An overview of proposed sites are presented in **Figure 2.**

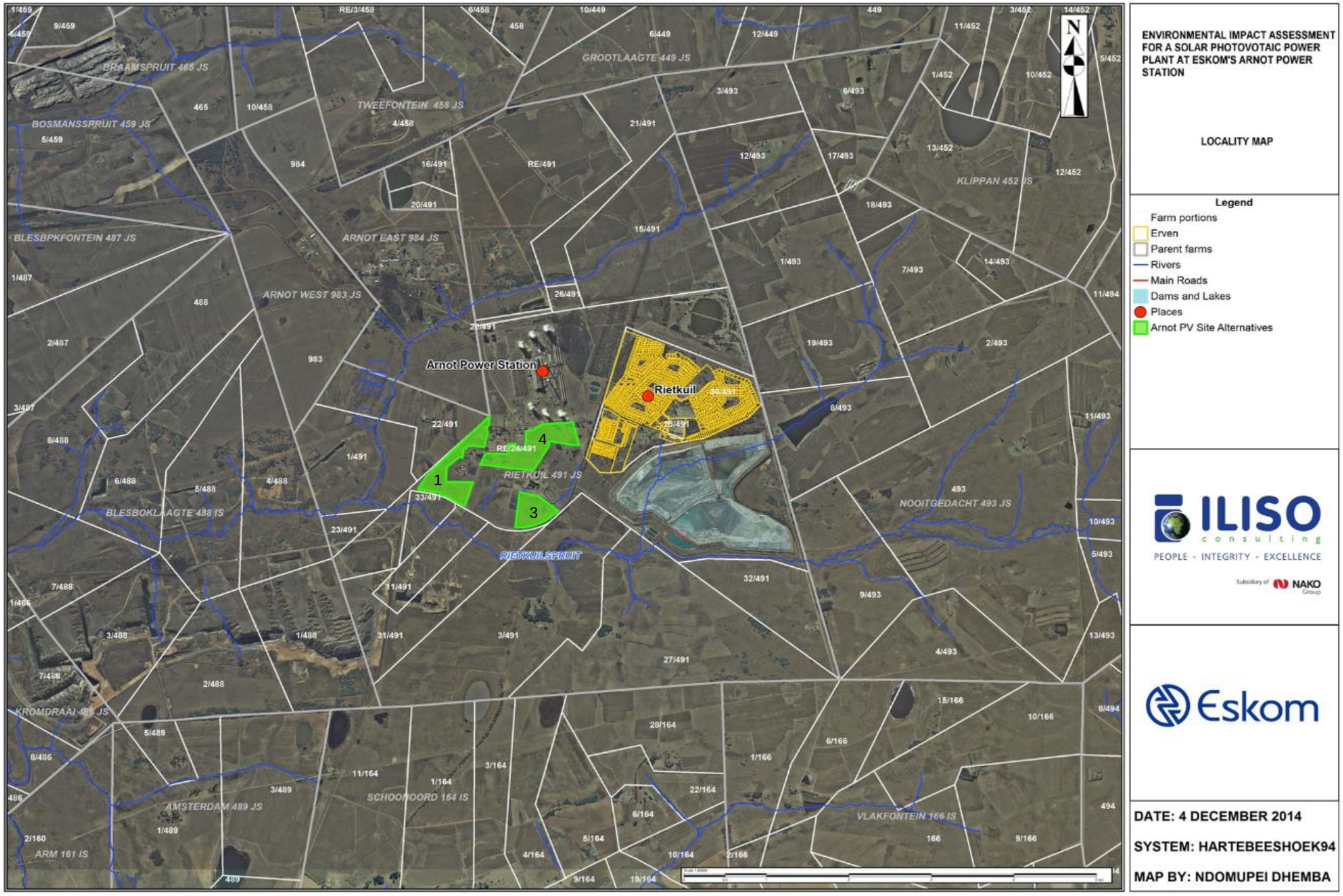

Figure 1: Locality Map for Solar PV Alternatives sites at Arnot Power Station

This additional electricity generated will be used for Eskom's own consumption at Arnot Power Station allowing Eskom to increase its electricity export to the grid. This will enable Eskom to diversify their energy mix, reduce their relative carbon footprint, and support the demand side management energy efficiency programme. The roll-out of this project will form part of the Eskom Renewables Strategy in the Eskom Renewables Energy Unit.

Site 1

Site 3

Site 4

Figure 2: Overview of Alternative Sites

1.2.1 Photovoltaic (PV) Plant design

Photovoltaic (PV) is a method of generating electrical power by converting solar radiation using semiconductors through photovoltaic effect. It is not the heat required from the sun but the amount of irradiation available that allows for electrical energy to be generated.

The plant and associated infrastructure are illustrated in **Figure 3** and are made-up of the following components:

- PV Cell: A basic PV device, which generates electricity when exposed to solar radiation. All PV cells produce Direct Current (DC) electricity;
- PV Module or Pane: The smallest complete assembly of interconnected PV cells. In the case of crystalline silicon cells, the cells are connected and compressed between a transparent layer and a backing material. The modules are typically mounted in a lightweight aluminium frame;

- PV Array: A group of PV modules connected together is termed as PV Array. An interconnected system of PV modules that function as a single electricity-producing unit. The modules are attached to a steel/aluminium mounting structure that is either pilled to the ground or has concrete slabs supporting it;
- String of modules: A number of PV panels connected in series. In this case, several strings will connect to a single inverter;
- Inverter Cabins: The electricity generated from the solar panels will be transferred via combiner boxes to the inverters. These combiner boxes combine the several cables that come from each string of modules into a unique pair of DC cables that is then connected to the inverter;
- Wiring to Inverters/Transformers: Array enclosures are wired to inverters, where DC is converted to Alternating Current (AC). The inverters function to convert DC electricity to AC electricity at grid frequency. The voltage is then stepped-up via transformers to be distributed via the power station grid. A Transmission Line will then connect the PV site with the connection point of the power station.
- Drainage channel for rain water;
- Control and Operations Building;
- Plant substation;
- Meteorological station; and
- Existing and new access roads.

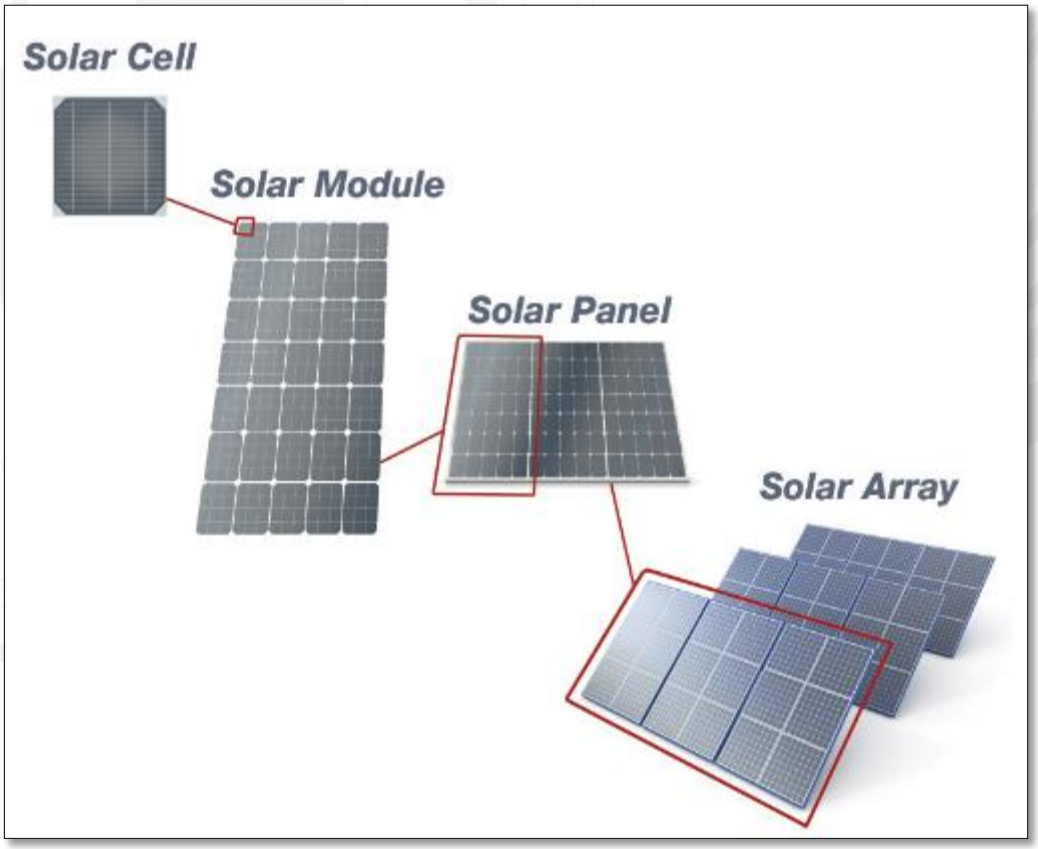

Figure 3: Solar PV Components

Figure 4: Solar PV Plant Array

Table 2 provides the parameters of the Arnot Power Station PV Plant.

Table 2: Parameters of Arnot Power Station PV Plant

Parameters of Arnot Power Station PV Plant	
PV plant dimension	25.8 ha
Estimated PV installation capacity	17.2 MWp
No. of Solar Panels	Approximately 68,800 (c-si technology) Approximately 172,000 (thin film technology)
Inverter Cabins	Approximately 17
Transmission line	Approximately length 2000 m – 3000 m
Fences	A 3 600 m fence; 3 m in height will be erected around the periphery of the site.

1.2.2 Construction Phase

The construction of the PV plant will take approximately up to 18 months and consists of the following process:

- Topsoil stripping and vegetation clearance will be undertaken within the proposed site;
- Topsoil will be stockpiled accordingly and used in the rehabilitation of site;
- Terrain levelling will be undertaken to ensure flat surfaces;
- Erection of site fencing around the parameter of site;
- Construction of required driveways and internal roads;

- Excavation works for cable trenches and foundations;
- Stockpiling of excavated material;
- Preparing internal underground cable laying;
- Preparation of suitable foundation for required buildings and plant facilities. Ready mix concrete will be used for foundations.
- Preparation of suitable foundations for PV mounting structure, ballast or pile foundations;
- Erection of PV mounting structures;
- Installation of internal underground cabling, combiner boxes, site surveillance facilities;
- Construction of a Control Room will be established to house control equipment and electrical switchgear.
- Installation of PV modules;
- Installation of inverters and inverter cabins; and
- Erection of power line (grid connection). One single line will connect the PV site with the connection point of the power station.

The Contractors will establish a site office within the footprint of the proposed project. This will include designated areas for prefabricated offices, equipment, and stockpiles. Portable sewage systems will be used by the construction staff and all other facilities (water and electricity) will be provided by the power station. It is estimated that an average of 50 vehicles will be operating on site during the material delivery and construction phase of the project. Abnormal loads will not be transported to site. It is therefore unlikely that external roads to the power station will have to be upgraded. Internal roads will be designed to accommodate the project requirements. Impacts of this will be addressed in the EMPr.

1.2.3 Operation Phase

The PV facility is designed to operate between up to 25 years at full productivity. After which the facility will operate at 80 % efficiency. It is approximated that 1 ton of CO_2 savings will be incurred for every MWh of PV generation making PV energy a necessary alternative in replacing energy generated from coal. **(Web 3).** Operating procedures include cleaning PV modules. Minimal water and no chemicals will be used to undertake this activity. Routine and corrective maintenance on electrical infrastructure and the mechanical vegetation control procedures will be undertaken during the operation phase. .

2. PURPOSE OF THE ENVIRONMENTAL IMPACT ASSESSMENT

The NEMA (107 of 1998), aims to promote the use of appropriate environmental management tools, such as an EIA, in order to ensure the integrated environmental management of activities.

The general objective of integrated environmental management, as described in the NEMA (Act 107 of 1998), is to identify, predict and evaluate the impacts of an activity on the social, economic, bio-physical and cultural components of the environment. This assessment includes the risks associated with activities, consequences of the activities as well as considering alternatives and mitigation measures to avoid, minimise or compensate for negative impacts, maximise benefits, and promote compliance with the principles of environmental management as set out in Section 2 of the NEMA (Act 107 of 1998). This is implemented by requiring Environmental Authorisation (EA) for activities that are "listed" in the EIA Regulations, 2010, as amended.

The purpose of this EIA is to assess the components of the project that are listed activities in the NEMA (Act 107 of 1998), for which Eskom will implement. The EIA process will provide the information that the authorities require to decide whether the project should be implemented or not, and if so then under what conditions.

2.1 PURPOSE OF THIS REPORT

This report serves to document the Scoping Phase of the EIA process. The report describes the proposed project, the receiving environment, and identifies key issues and alternatives to be investigated in the impact assessment phase. It also describes the way forward in the Plan of Study (PoS) for the EIA phase.

2.2 DETAILS AND EXPERTISE OF THE ENVIRONMENTAL ASSESSMENT PRACTIONER (EAP)

Ms Terry Calmeyer is a Director of ILISO Consulting Environmental Management (Pty) Ltd and a certified Environmental Assessment Practitioner (EAP). She has a Master's degree in Environmental Management and over 20 years' experience. She specialises in Environmental Impact Assessments, the environmental components of project implementation and Project Management. Terry serves on the International Association of Impact Assessment (IAIA) Council, is the past President of the South African Affiliation of the International Association of Impact Assessment (IAIAsa) and an active member of the South African Committee on Large Dams (SANCOLD), the Environmental Law Association and the International Association for Public Participation. She has been involved in a variety of EIAs including those for transmission lines, water supply projects, dams, roads, railways, waste water treatment works and airports, in South Africa, Uganda, Lesotho, Botswana, Namibia and Mozambique.

2.3 PROJECT TEAM

In addition to the EAP, the ILISO Consulting (Pty) Ltd project team includes the following individuals: Mr Deon Esterhuizen (Project Director), Sandhisha Jay Narain (Assistant EAP), Kim Dalhuijsen, Joseph Masilela; Ruan Schoeman (Public Participation Process administrators); and Ndomupei Dhemba (GIS specialist), A summary of the project team, including specialists, and their roles is provided in **Table 3**. Curricula Vitae are included in **Appendix A.**

Table 3: Summary of the ILISO Project Team and their Roles

Role	Project Team Member	Company
Project Director/Leader	Deon Esterhuizen	ILISO Consulting (Pty) Ltd
Project Manager/EAP	Ms Terry Calmeyer	ILISO Consulting (Pty) Ltd
Public Participation Process Manager	Ms Terry Calmeyer	ILISO Consulting (Pty) Ltd
Assistant EAP	Ms Sandhisha Jay Narain	ILISO Consulting (Pty) Ltd
GIS	Ms Ndomupei Dhemba	ILISO Consulting (Pty) Ltd
Public Participation Process Administrators	Mr Joseph Masilela Ms Kim Dalhuijsen Mr Ruan Schoeman	ILISO Consulting (Pty) Ltd
Fauna, Flora and Wetland Assessment	Mr Emile van der Westhuizen	Scientific Aquatic Services
	Stephen van Staden	
	Mr Hennie de Beer	
	Christopher Hooton	
Soil Impact Assessment	Dr David Garry Paterson	ARC-Institute for Soil, Climate and Water
Social Impact Assessment	Mrs Nanja Churr	Kayamandi Development Services
Heritage Impact Assessment	Dr Johnny van Schalkwyk	Head of Research: National Cultural History Museum

A short description of the key qualifications and capabilities of the team members are presented below.

Mr Deon Esterhuizen has a Masters degree in Environmental Management with more than 20 years of experience in water and environment related projects, which include water resource management, water quality management, water use registration and licensing of water users, including project management of multi-disciplinary studies. He has extensive experience in a wide-range of environmentally related projects, processes and applications for private, commercial and industrial

clients, in addition to local, provincial and national government departments. Deon has been involved with various projects for Eskom such as the Waste Management Application Licence for Ingula and Kusile. He has also been responsible for obtaining various Environmental Authorisations for the Gautrain. He is registered as a professional natural scientist with the South African Council for Natural Scientific Professions (SACNSP).

Ms Sandhisha Jay Narain is an Environmental Consultant with an Honours degree in Environmental Management. She has 6 years on site Environmental Management and Environmental Compliance Auditing and Monitoring experience. Sandhisha has been involved in the implementation of the Environmental Management Plan for the Moses Mabhida Stadium, compliance monitoring of Transnet's New Multi-Purpose Pipeline Project and was project based at the Spring Grove Dam as the Environmental Monitor for the Engineering Consultant. She is also an accredited Green Star SA Professional.

Ms Ndomupei Dhemba has 9 years' experience and a Master's degree in GIS and Remote Sensing for Environmental Management. She has been involved in a number of EIA programmes as a Biodiversity and GIS & Remote Sensing Specialist in Zimbabwe, Botswana, Tanzania and South Africa. Ndomupei also has extensive experience in licencing of water users and the completion of Environmental Impact Assessments in support of the issuing of Environmental Authorisations. She is conversant with ArcGIS, ERDAS, ILWIS, Planet GIS, Google earth Pro, ExpertGPS and ENVI.

Mr Joseph Masilela has 8 years' experience in office administration and community liaison work. This includes arranging meetings, facilitating community workshops; meeting with traditional authorities and assisting on all project related work. Joseph assists with secretarial functions for projects including, the maintenance of attendance registers and databases for all projects. He also undertakes field work and data input into AutoCAD programmes.

Ms Kim Dalhuijsen has 2 years' experience and an Honours degree in Zoology and Environmental Sciences from the University of the Witwatersrand. She has been responsible for drafting impact assessment reports and Environmental Management Programmes, and assisting with public participation processes. Kim has a good understanding of the laws and regulations relating to air quality, water, biodiversity, heritage, and waste management in South Africa.

Mr Ruan Christiaan Schoeman has 3 years' experience on site experience and an Honours Degree in Geography from the University of Johannesburg. Ruan has gained on site experience as an Eskom Environmental Officer for the Spitskop – Dinaledi 400kV Transmission Power Lines Section G and the Dinaledi Substation. He is experienced in ISO 14001 implementation and compliance monitoring applicable to environmental legislation.

Stephen van Staden has a Masters degree from the University of Johannesburg in Environmental Management. Stephen has experience on over 1 000 environmental assessment projects specifically with aquatic and wetland ecological studies as well as terrestrial ecological assessments and project management. Stephen has a professional career spanning more than 10 years, most of which have been as the owner and managing member of Scientific Aquatic Services. He is registered by the South African River Health Project as an accredited aquatic biomonitoring specialist and is also registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions in the field of ecology. Stephen is also a member of the Gauteng Wetland Forum and South African Soil Surveyors Association

Mr Emile van der Westhuizen has 9 years' experience in Ecological Assessments and has a Bachelor of Science (BSc) Botany and Environmental Management degree from UNISA and holds a BSc (Hons) Plant science degree with specialisation in terrestrial plant ecology from the University of Pretoria (UP). Emile skills include GIS and Wetland Delineation processes. He has extensive experience in EIA's, BA's, Water Use Licensing and the development of Rehabilitation Plans, Landscape plans and Visual Assessments. Emile has been involved in various projects throughout Africa (including South Africa, Ghana, the DRC and Mozambique) focusing on terrestrial ecological assessments which involve phytosociological community assessments, RDL faunal and floral species assessments, alien and invasive species control methods and rehabilitation plans.

Mr Hennie de Beer has a National Diploma in Nature Conservation and extensive experience in Ground Hornbill Monitoring and Vegetation Monitoring at the Timbavati Private Nature Reserve. He has assisted members of the Agriculture Research Council doing Vegetation Condition Assessments on +/- 750 sites in the Lowveld area as well as at Gorongoza National Park. Hennie has also done work on eradicating problem aquatic plants in water canals, assisted in water quality monitoring and data analysis. He currently serves as an ecologist, specializing in avifaunal studies.

Christopher Hooton obtained his National Diploma in Nature Conservation and completed his BTech Nature Conservation degree both at Tshwane University of Technology. He has gained 3 years' experience as an ecologist, specialising in faunal studies. Chris worked for the Lowveld Wild Dog Project, based in Savé Valley Conservancy, Zimbabwe where he gained invaluable field experience collaring, tracking and population management of the Wild Dogs, and assisted with a lion and leopard collaring project.

Mrs Nanja Churr has 14 years' experience and Bachelor of Science Degree in Town and Regional Planning (cum laude). She has acquired excellent skills in the field of socio-economic and economic development of rural and urban communities, inclusive of the dynamic impacts associated with socio-economic and economic impact assessments, urban frameworks, economic frameworks, development plans, feasibility studies, urban revitalisation studies, integrated development planning, local

economic development plans, socio-economic research, baseline surveys and needs assessment, rural and community development, policy analysis and formulation, macro-economic analysis, feasibility studies and business plan development. Nanja has also obtained valuable International Training in Canada on Regional Planning and Economic Investment Analysis, theory of economic development, and practice of Economic Development.

Dr David Garry Paterson has more than 30 years work experience as a soils specialist. Dr Paterson has experience in soil classification and mapping, soil interpretations, soil survey project management environmental assessment, soil survey and land capability course presentation and ground penetrating radar.

Dr J A van Schalkwyk, D Litt et Phil, heritage consultant, has been working in the field of heritage management for more than 30 years. Based at the National Museum of Cultural History, Pretoria, he has actively done research in the fields of anthropology, archaeology, museology, tourism and impact assessment. This work was done in Limpopo Province, Gauteng, Mpumalanga, North West Province, Eastern Cape, Northern Cape, Botswana, Zimbabwe, Malawi, Lesotho and Swaziland. He has curated various exhibitions at different museums and has published more than 60 papers. During this period he has done more than 1 500 impact assessments (archaeological, anthropological and social) for various government departments and developers. Projects include environmental frameworks, roads, pipelines, power lines, dams, mining developments, water purification works, historical landscapes, refuse dumps and urban developments.

3. LEGISLATION AND GUIDELINES CONSIDERED

It is acknowledged that the 2014 EIA regulations, which repeal and replace the 2010 EIA Regulations consist of:

- General Notice (GN) 982: Specifies the EIA Process Regulations (excluding exemptions and appeals.);
- GN 983: Listing Notice 1 which identifies activities that would require environmental authorisations prior to commencement of that activity for which a Basic Assessment is required;
- GN 984: Listing Notice 2 which identifies activities that would require environmental authorisations prior to commencement of that activity for which a Scoping and Environmental Impact Assessment is required; and
- GN 985: Listing Notice 3 which activities that would require environmental authorisations prior to commencement of that activity in specific identified geographical areas only.

The Application to undertake the proposed project was submitted on the 13th November 2014. A project reference number was received from the Department of Environmental Affairs (DEA) on the 3rd December 2014. Amendments to the application were made and acceptance thereof was received by DEA on the16th January 2015.

As confirmed by DEA, this EIA is being carried out under the 2010 EIA Regulations in terms of the NEMA (107 of 1998). The following Regulations promulgated in terms of NEMA apply:

- GN 543 – specifies the process that must be undertaken to obtain an Environmental Authorisation;
- GN 544 – Listing Notice 1 which identifies activities that would require environmental authorisations prior to commencement of that activity for which a Basic Assessment is required;
- GN 545 – Listing Notice 2 which identifies activities that would require environmental authorisations prior to commencement of that activity for which a Scoping and Environmental Impact Assessment is required; and
- GN 546 - Listing Notice 3 which activities that would require environmental authorisations prior to commencement of that activity in specific identified geographical areas only.

3.1 LISTED ACTIVITIES TO BE AUTHORISED IN TERMS OF NEMA

The proposed project involves several activities listed in terms of Section 24 of the NEMA (Act 107 of 1998) (**Table 4**). An Environmental Authorisation must be issued by the national DEA prior to commencing with the project.

Table 4: List of activities to be authorised in terms of NEMA

Listed activity as described in GN R.544, 545 and 546	Listed activity as described in GN R.983, 984 and 985	Proposed Arnot PV Site
GN R.545 Item 15: **Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more.**	***GN R. 984 Item 15*** **The clearance of an area of 20 hectares or more of indigenous vegetation.**	The required footprint for the construction of the Solar Photovoltaic facility, is 25.8 ha with a projected power peak of 17.2 MWp. This property is owned by Eskom Arnot Power Station.
GN R.544 Item 1 (i): **The construction of facilities or infrastructure for the generation of electricity where:** (i) the electricity output is more than 10 megawatts but less than 20 megawatts.	***GN R.983 Item 2(i):*** **The development and related operation of facilities' or infrastructure for the generation of electricity where:** (i) the electricity output is more than 10 megawatts but less than 20 megawatts. Excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs within the urban area.	The proposed Solar Photovoltaic facility has a projected power peak of 17.2 MWp.
GN R. 544 Item 22 (ii): **The construction of a road, outside urban areas,** (ii) where no reserve exists, where the road is wider than 8 metres.	***GN R. 583 Item (ii):* The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 km:** (ii) where no reserve exists, where the road is wider than 8; metres excluding where widening or lengthening occur inside urban areas.	An access road wider than 8 metres and where no reserve exists will be constructed to gain access to the proposed Solar Photovoltaic facility.

GN R.544 Item 29(i): **The expansion of facilities for the generation of electricity where:** (i) the power peak will be increased by 10 megawatts or more, excluding where such expansion takes place on the original development footprint		The required footprint for the construction of the Solar Photovoltaic facility, 25.8 ha with a projected power peak of 17.2 MWp. This property is owned by Eskom Arnot Power Station. The 17.2 MWp will result in an increase in the power station's generation capacity.

3.2 CONTENTS OF THE SCOPING REPORT

Table 5 sets out the requirements, in accordance with Section 28 of GN 543, of the content of the scoping report.

Table 5: Scoping Report Content in terms of Section 28 of GN 543

	EIA Regulations requirements	Scoping Report
(a)	Details of EAP and expertise to carry out scoping procedures	Chapter 2
(b)	Description of the Proposed Activity	Chapter 1
(c)	Description of Alternatives	Chapter 5
(d)	Description of the property on which the activity is to be undertaken and the location of the activity on the property	Chapter 1
(e)	Description of the affected environment. Description of the manner in which the activity may be affected by the environment.	Chapter 7
(f)	Legislation and guidelines considered	Chapter 3
(g)	Environmental issues and potential impacts, including cumulative impacts	Chapter 8
(h)	Details of Public Participation Process (PPP) conducted: (i) Steps taken to notify potentially interested and affected parties of the application; (ii) Proof of on-site notices and notification letters; (iii) Stakeholder database; and (iv) Summary of issues raised by interested and affected parties (I&APs) including response from EAP on issues.	Chapter 6
(i)	Need and Desirability of proposed activity	Chapter 4
(j)	Description of potential alternatives	Chapter 5
(k)	Copies of I&AP representations and comments received	Appendix B
(l)	Copies of minutes of meetings with I&APs /stakeholders	Appendix B
(m)	Responses by EAP to those representations and comments and views	Appendix B
(n)	Plan of Study (PoS) for EIA including: i) Description of tasks to be undertaken; ii) Stages of competent authority (CA) consultation;	Chapter 8

	iii) Methodology for assessing environmental issues; and iv) Details of PPP to be conducted during EIA.	
(o)	Specific information required by CA	Chapter 3.3
(p)	Other matters required in terms of sections 24(4)(a) and (b) of the Act, i.e. NEMA section 24 (4) Procedures for the investigation, assessment and communication of the potential consequences or impacts of activities on the environment- (a) must ensure, with respect to every application for an environmental authorisation- (i) coordination and cooperation between organs of state in the consideration of assessments where an activity falls under the jurisdiction of more than one organ of state; (ii) that the findings and recommendations flowing from an investigation, the general objectives of integrated environmental management laid down in this Act and the principles of environmental management set out in section 2 are taken into account in any decision made by an organ of state in relation to any proposed policy, programme, process, plan or project; (iii) that a description of the environment likely to be significantly affected by the proposed activity is contained in such application; (iv) investigation of the potential consequences for or impacts on the environment of the activity and assessment of the significance of those potential consequences or impacts; and (v) public information and participation procedures which provide all interested and affected parties, including all organs of state in all spheres of government that may have jurisdiction over any aspect of the activity, with a reasonable opportunity to participate in those information and participation procedures; and (b) must include, with respect to every application for an environmental authorisation and where applicable- (i) investigation of the potential consequences or impacts of the alternatives to the activity on the environment and assessment of the significance of those potential consequences or impacts, including the option of not implementing the activity; (ii) investigation of mitigation measures to keep adverse consequences or impacts to a minimum; (iii) investigation, assessment and evaluation of the impact of any proposed listed or specified activity on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999), excluding the national estate contemplated in section 3(2)(i)(vi) and (vii) of that Act; (iv) reporting on gaps in knowledge, the adequacy of predictive methods and underlying assumptions, and	Will be addressed in the Environmental Impact Assessment Phase of the project Will be addressed in the Environmental Impact Assessment Phase of the project Will be addressed in the Impact Assessment Phase of the project Will be addressed in the Environmental Impact Assessment Phase of the project Will be addressed in the Environmental

	uncertainties encountered in compiling the required information; (v) investigation and formulation of arrangements for the monitoring and management of consequences for or impacts on the environment, and the assessment of the effectiveness of such arrangements after their implementation; (vi) consideration of environmental attributes identified in the compilation of information and maps contemplated in subsection (3); and (vii) provision for the adherence to requirements that are prescribed in a specific environmental management Act relevant to the listed or specified activity in question.	Impact Assessment Phase of the project This will be addressed in the EMPr. Will be addressed in the Environmental Impact Assessment Phase.

3.3 SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

The Department of Environmental Affairs (DEA), in its acknowledgement of receipt on the 3rd December 2014 and acceptance of the revised application forms for the project dated 16th January 2015, requires the following:

- Alternatives must be identified and further investigated to determine if they are feasible and reasonable. It is also mandatory to investigate and assess the option of not proceeding with the proposed activity (the "no-go" option);
- Should water, solid waste removal, effluent discharge, storm water management and electricity services be provided by the municipality, you are requested to provide DEA with written proof that the municipality has sufficient capacity to provide the necessary services to the proposed development. Confirmation of the availability of services from the service providers must be provided together with the reports to be submitted;
- It must be demonstrated how the proposed development will meet the requirements of sustainable development. It must consider energy efficient technologies and water saving devices and technologies for the proposed development;
- A detailed and complete EMPr must be submitted with the EIR. This EMPr must not provide recommendations but must indicate actual remediation activities which will be binding on the applicant. Without the EMPr the documents will be regarded as not meeting the requirements and will be returned to the applicant for correction;
- The applicant/EAP is required to inform the Department in writing upon submission of any draft report, of the contact details of the relevant State Departments (that administer laws relating to a matter affecting the environment) to whom copies of the draft report were submitted for comment. Upon receipt of this confirmation, the DEA will in accordance with Section 24 (2) and (3) of the NEMA inform the relevant State Departments of the commencement date of the 30 day commenting period, or 60 days in the case of the Department of Water and Sanitation for waste management activities which also require a licence in terms of the National Water Act (Act 36 of 1998);

- Should it be necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999), please submit the necessary application to the South African Heritage Resource Agency (SAHRA) or the relevant provincial heritage agency and submit proof thereof with the Environmental Impact Assessment Report. The relevant heritage agency should also be involved during the public participation process and have the opportunity to comment on all the reports to be submitted to the DEA; and
- A Final site layout plan together with the final EIR must be submitted to the Department. All biodiversity information must be used in the finalisation of the layout plan.

3.4 OTHER AUTHORISATION REQUIREMENTS

3.4.1 Heritage Impact Assessment

The proposed project involves activities listed in terms of section 38 of the National Heritage Resources Act 25 of 1999 (NHRA), which require authorisation from the relevant heritage authorities.

According to section 38, the SAHRA requires that a Heritage Impact Assessment (HIA) is undertaken where certain activities are proposed. The activities that apply to the proposed installation of a Solar PV Power Plant at Arnot Power Station include:

- 38(1) (a) - The construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length; and
- 38(1) (c) - Any development or other activity which will change the character of a site Exceeding 5 000 m^2 in extent.

A HIA will be conducted as part of the EIA process. The HIA will be submitted to the SAHRA for decision-making regarding heritage resources.

3.5 APPLICABLE POLICIES AND LEGISLATION

The following section provides an overview of the policy and legislative framework in which the development of renewable energy projects takes place in South Africa.

- **White Paper on the Energy Policy of the Republic of South Africa (1998)**

  The White Paper on the Energy Policy of South Africa (1998) was published in response to the shifting political climate and socio-economic position of the country. It acknowledges that South Africa has neglected the development and implementation of renewable energy applications, despite the fact that the country's renewable resource base is extensive. The White Paper therefore commits to government's focused support for the development, demonstration and implementation of renewable energy sources for both small and large-scale applications. Specific emphasis is given to solar and wind energy sources, particularly for rural and often off-grid areas with the aim of drawing on international best practice. While considering the larger environmental implications of energy production and supply, the advantages highlighted in the

White Paper include the minimisation of environmental impacts in operation in comparison with traditional supply technologies and the lower economic cost. It is with this outlook that solar energy, is seen as a viable, attractive and sustainable option to be promoted as part of South Africa's energy policy towards energy diversification.

- **White Paper on Renewable Energy (2003)**
  The White Paper on Renewable Energy supplements the White Paper on the Energy Policy of the Republic of South Africa (1998). The White Paper sets out the vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa. At the outset the policy refers to the long term target of *"10 000 GWh renewable energy contribution to final energy consumption by 2013."* The aim of this 10-year plan is to meet this goal via the production of mainly biomass, wind, solar and small-scale hydro sources. It is estimated that this would constitute approximately 4 % of projected energy demand for 2013. The White Paper presents South Africa's options in terms of renewable energy as extensive and a viable and sustainable alternative to fossil fuel options. A strategic programme of action to develop South Africa's renewable energy resources is proposed, particularly for power generation and reducing the need for coal-based power generation. The starting point will be a number of initial investments spread across both relatively low cost technologies, such as biomass-based cogeneration, as well as technologies with larger-scale application, such as solar water heating, wind and small-scale hydro. The White Paper provides the platform for further policy and strategy development in terms of renewable energy in the South African energy environment.

- **National Energy Act (2008); and the National Electricity Regulation Act (2006);**
  South Africa has two acts that direct the planning and development of the country's electricity sector:
  i. The National Energy Act (No. 34 of 2008); and
  ii. The Electricity Regulation Act (ERA) (No. 4 of 2006).

  In May 2011, 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 Independent Power Producer (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.

- **Integrated Energy Plan (IEP) for the Republic of South Africa (2003)**
  Commissioned by Department Mineral and Energy (DME) in 2003, now the DoE, the Integrated Energy Plan (IEP) aims to provide a framework in which specific energy policies, development decisions and energy supply trade-offs can be made on a project-by-project basis. The framework is intended to create a

balance in providing low cost electricity for social and economic developments, ensuring security of supply and minimising the associated environmental impacts. The IEP projected that the additional demand in electricity would necessitate an increase in electricity generation capacity in South Africa by 2007. Furthermore, the IEP concluded that, based on energy resources available in South Africa, coal would be the primary fuel source in the 20 year planning horizon, which was specified as the years 2000 to 2020, although other cleaner technologies continue to be investigated as alternatives in electricity generation options (Aurecon, 2013).

- **Integrated Resource Plan (IRP) (2010)**
  The Integrated Resource Plan (IRP) is a National Electricity Plan, which is a subsection of the Integrated Energy Plan. The IRP a plan that directs the expansion of the electricity supply over the given period. The IRP, indicating the schedule for energy generation programmes, was first gazetted on 31 December 2009. A revised schedule was gazetted on 29 January 2010 and the schedule has once again been revised and the final IRP (IRP2010-2030) was gazetted on 6 May 2011. Developed for the period of 2010 to 2030, the primary objective of the IRP 2010, is to determine the long-term electricity demand and detail how this demand should be met in terms of generating capacity, type, timing, and cost. While promoting increased economic development through energy security, the IRP2010 aims to achieve a *"balance between an affordable electricity price to support a globally competitive economy, a more sustainable and efficient economy, the creation of local jobs, the demand on scarce resources such as water and the need to meet nationally appropriate emission targets in line with global commitments"* (Aurecon, 2013).

- **National Integrated Resource Plan for Electricity (NIRP) (2002)**
  The National Integrated Resource Plan (NIRP) for Electricity is a long-term electricity capacity plan which defines the need for new generation capacity for the country. The National Energy Regulator of South Africa (NERSA) published NIRP1 in 2002, which was replaced by NIRP2 in 2005. The outcome of the NIRP2 determined that coal would remain the major fuel for generating electricity over the next 20 years and that additional energy generation facilities would be required from 2007 onwards. The NIRP is replaced by the IRP (Aurecon, 2013).

- **Policies regarding greenhouse gas and carbon emissions**
  Gases that contribute to the greenhouse effect are known to include carbon dioxide (CO_2), methane (CH_4), water vapour, nitrous oxide, chlorofluorocarbons (CFCs), halons and peroxyacylnitrate (PAN). All of these gasses are transparent to shortwave radiation reaching the earth's surface, but trap long-wave radiation trying to leave the earth's surface. This action leads to a warming of the earth's lower atmosphere, resulting in changes in the global and regional climates, rising sea levels and extended desertification. This in turn is expected to have severe ecological consequences and a suite of implications for mankind. Electricity generation using carbon based fuels is responsible for a large proportion of CO_2

emissions worldwide. In Africa, the CO_2 emissions are primarily the result of fossil fuel burning and industrial processes, such as coal fired power stations. South Africa accounts for some 38 % of Africa's CO_2 emissions. The global per capita CO_2 average emission level is 1.23 metric tonnes. In South Africa however, the average emission rate is 2.68 metric tonnes per person per annum. The International Energy Agency (2008) estimates that nearly 50 % of global electricity supplies will need to come from renewable energy sources in order to halve CO_2 emissions by 2050 and minimise significant, irreversible climate change impacts.

The United Nations Framework Convention on Climate Change (UNFCCC) initiated a process to develop a more specific and binding agreement on the reduction of greenhouse gas (GHG) emissions. This led to negotiations with a particular focus on the commitments of developed countries, and culminated in the adoption of the Kyoto Protocol in 1997, which came into effect in February 2005. Using the above framework to inform their approach, the Kyoto Protocol has placed specific legal obligations in the form of GHG reduction targets on developed countries and countries with 'Economies in Transition'. The developed countries listed in Annex 1 of the UNFCCC are required to reduce their overall emissions of six GHGs by at least 5 % below the 1990 levels between 2008 and 2012. While South Africa, as a developing country, is not obliged to make such reductions, the increase in greenhouse gas emissions must be viewed in light of global trends to reduce these emissions significantly. More recently under the Copenhagen Accord 2010, countries representing over 80 % of global emissions have submitted pledges on emission reductions. South Africa's commitment is to reduce GHG emissions 34 % by 2020 and 42 % by 2025.

The Kyoto Protocol, to which South Africa is a signatory, was informed by the principles of sustainable development which resulted in related policies and measures being identified to promote energy efficiency while protecting and enhancing the 'sinks and reservoirs' of greenhouse gases (forests, ocean, etc.). Other methods/approaches included encouraging more sustainable forms of agriculture, in addition to increasing the use of new and renewable energy and the adoption/implementation of advanced and innovative environmentally sound technologies. South African policies are informed by the Kyoto Protocol and its partial successor the Copenhagen Accord 2010 and associated sustainable development principles whereby emphasis is being placed on industries for 'cleaner' technology and production (Aurecon, 2013).

4. NEED AND DESIRABILITY

South Africa is facing considerable constraints in the availability and stability of electricity supply. Having the highest levels of solar radiation in the world, South Africa has considerable solar resource potential for Solar PV power generation. Such renewable energy is recognized internationally as a major contributor in achieving a wide range of environmental, economic and social benefits that can contribute toward steering South Africa toward sustainability and achieving long term global sustainability. Due to concerns such as climate change, and the ongoing exploitation of non-renewable, resources, there is increasing international pressure on countries to increase their share of renewable energy generation. The sections below will show that the need for renewable energy in South Africa is well documented.

4.1 STRATEGIC CONTEXT FOR THE CONSIDERATION OF NEED AND DESIRABILITY

The Department of Environmental Affairs (DEA) draft guidelines on need and desirability in terms of the EIA Regulations, 2010 (DEA, 2010) explains that, while it is essential that growth in the economy effect to national policies and strategies, it is essential that the implementation of these social and economic policies take cognisance of strategic concerns such as climate change, food security as well as the sustainability in supply of natural resources and the status of our ecosystem services.

Consistent with the National Framework for Sustainable Development (NFSD) (DEA, (2010), Companion to the EIA Regulations 2010, Integrated Environmental Management Guideline Series 9, Department of Environmental Affairs (DEA), Pretoria, South Africa ISBN: 978-0-9802694-4-4) it is required that spending on economic infrastructure is focused in priority areas with potential for economic development that serves the broader societies needs equitably. What is needed and desired for a specific area is strategically and democratically determined during the formulation of Integrated Development Plans (IDPs), and Spatial Developmental Frameworks (SDFs).

4.2 NATIONAL STRATEGY FOR SUSTAINABLE DEVELOPMENT, 2011

The following strategic objectives are identified in the National Strategy for Sustainable Development and Action Plan (2011):

- Enhancing systems for integrated planning and implementation;
- Sustaining our ecosystems and using natural resources efficiently;
- Building sustainable communities;
- Responding effectively to climate change; and
- Moving towards a green economy.

The Environment sector has developed an implementation plan with nine key focus areas, for contributing to the achievement of a national green economy, (DEA 2011), namely:

1. Resource conservation and management;

2. Sustainable waste management practices;
3. Water management;
4. Environmental sustainability;
5. Green buildings and the built environment;
6. Sustainable transport and infrastructure;
7. Clean energy and energy efficiency;
8. Agriculture, food production and forestry; and
9. Sustainable consumption and production.

4.3 NATIONAL SPATIAL DEVELOPMENT PLAN (NSDP)

The National Spatial Development Plan (NSDP) argues that the spatial configuration of our country is not only the product of investment and growth, but also of apartheid spatial planning. The resulting spatial marginalisation from economic opportunities by large segments of the country's population is still a significant feature of South Africa's space economy and needs to be addressed to reduce poverty and inequality, ensuring shared growth.

The NSDP seeks to assist government to achieve the following development objectives and principles for the country:

- To focus fixed investment in areas with development potential. It is argued that these areas present the greatest possibility for both economic growth and poverty alleviation; and
- To ensure that citizens in areas with limited potential are provided with a package of essential public services, focusing on human resource development, labour market intelligence and social grants. It is argued that the prevalence of high poverty in an area does not mean that poverty can be more effectively addressed in that area.

In order to achieve a common platform for deliberation and decision-making around infrastructure investment and development spending decisions, there are two fundamental key components of the NSDP:

1. The defining of the space economy in terms of 'need' and 'development potential'; and
2. Utilising the set of guiding principles by all actors in government when planning, deliberating and budgeting for investment and spending.

This requires a well-coordinated and integrated system of planning in which the plans at a national, provincial and local level mutually inform each other, and in which there is agreement on the priorities for infrastructure investment and development spending. This in turn requires coordination and alignment in and between the spheres of government, notably through the alignment and harmonisation between:

- The national Medium Term Strategic Framework (MTSF);
- The national and provincial Medium Term Expenditure Frameworks (MTEFs);
- The Provincial Growth and Development Strategies (PGDSs);

- The annual budgets of national and provincial government departments, State-owned enterprises and municipalities, and
- Municipal Growth and Development Strategies (GDSs), IDPs and Spatial Development Frameworks (SDFs).

To utilise this prospect requires that intergovernmental district-wide agreements are reached on the needs and development potentials of the district space economy. Once these have been reached, these agreements then provide the base for:

- Preparing and reviewing an IDP in a district; and
- Agreements on the roles and responsibilities regarding infrastructure investment and development spending in the development of the district.

4.4 INTEGRATED DEVELOPMENT PLANS AND SPATIAL DEVELOPMENT FRAMEWORKS

4.4.1 Municipal IDPs

According to the Municipal Systems Act (32 of 2000) (MSA), all municipalities have to undertake an IDP process. The IDP is a legislative requirement thus it has legal status and supersedes all other plans that guide development at local government level.

An IDP is defined as an inclusive and strategic plan that:

- Links, integrates and co-ordinates a municipality's sector specific plans;
- Aligns the resource and capacity of the municipality to the overall development objectives of the municipality;
- Forms the policy framework on which annual budgets rest; and
- Informs and aligns with similar development plans at national and provincial spheres.

The Nkangala District Municipality (NDM) has published an extensive IDP which identifies the need to look toward renewable energy. The IDP (2013/2014) highlights that, "*the Security of coal supply for some existing coal power stations is increasingly under threat and in promoting environmental sustainability, the NDM has realized the need to explore other energy forms, which are renewable, beyond focusing on coal-generated electricity as the main supply of energy."* Even though the proposed project will be used for Eskom's own consumption at Arnot Power Station it will allow Eskom to increase its electricity export to the grid. In doing so, this will enable Eskom to support the demand side management energy efficiency programme as well as gain international significance as it contributes to South Africa being able to meet some of its international obligations, by aligning domestic policy with internationally agreed strategies and standards.

4.4.2 Spatial Development Framework

In terms of Section 26(e) of the MSA (Act 32 of 2000), every municipality is required to formulate a SDF as a part of its IDP. A SDF is a plan that seeks to guide overall

spatial distribution of current and future desirable land uses within a municipality, in order to give physical effect to the vision, goals and objectives of the municipal IDP. It highlights priority investment and development areas and serves as a guide to decision-makers and investors. A SDF is thus an integral component of the corresponding IDP, its purpose being to translate the IDP into its spatial implications to provide broad, overall development guidelines. The aim of a SDF is not to control spatial development but rather to act as a framework that gives strategic guidance in respect of the location and nature of anticipated future development in a given municipality. Because land is a scarce resource, it needs to be planned in the most optimum manner

NDM undertook the review of the SDF (2010) of the district. The STLM has already adopted their SDF (2010). The following highlights the main objectives to be adopted for the future development of the district focusing on the provision of basic needs and sustainable management practices:

- To improve living conditions through the formalisation and upgrading of informal settlements and provision of basic services; and
- To enhance biodiversity conservation through environmentally sustainable development.

The SDF (2010) of Steve Tshwete reveals that in regards to energy “maximising provincial benefits from the mining and energy sectors while mitigating any environmental impacts natural resource optimisation needs to be targeted”. The SDF (2010) states, that with regards to sustainable development “renewable energy and electricity generation is needed” to assist in cooking/heating and for lighting purposes.

Based on the analysis of the above-mentioned documents (see also section 3.5 for detail), it can be concluded that the proposed solar PV plant is in accordance with national energy planning policy with respect to renewable energy which has links to climate change, environmental impact and energy security/flexibility considerations. Moreover the concept of a solar energy project is broadly supported in local economic planning documents. Considered as a whole the IDP and SDF recognise the importance of integrated and diversified development that makes optimal use of each area’s comparative advantages. The concept of a solar energy project is thus broadly supported and the levels of support for these projects in the wider area and other parts of South Africa indicates that interest in their potential to add to sustainable development.

5. ALTERNATIVES

One of the objectives of an EIA is to avoid and minimise negative impacts where-ever possible. The primary tool for avoiding impacts is to consider alternatives. An alternative is a possible course of action, in place of another, that would generally meet the same purpose and need defined by the development proposal but which would avoid or minimize negative impacts or enhance project benefits.

Alternatives must be practical, feasible, relevant, reasonable and viable. They can be in terms of:

- Activity (project) alternatives;
- Location;
- Scheduling (Timing);
- Technology (Process);
- Design;
- Different use of land;
- Demand;
- Inputs; or
- Routing.

It is also a requirement of the Regulations that the "No-go"/"Do nothing" option be comparatively assessed. Three (3) alternative sites surrounding the Arnot Power Station were identified for possible development and are further discussed in Section 5.1 of this report.

5.1 SITE SELECTION

A site screening assessment was undertaken in 2013 in order to better understand the constraints and opportunities of constructing PV facilities to feed Eskom's auxiliary loads. This assessment formed part of the Eskom's Ilanga PV Project Portfolio which aims to install 150 MWp at their various power stations, offices and substations. The following information was extracted from the Eskom Ilanga PV Portfolio Power Stations Sites Screening Report (Arup, 2013).

The proposed sites were selected based on the following criteria:

- Potential capacity;
- Land availability;
- Environmental constraints; and
- Electrical connection.

Originally nine (9) areas surrounding the Arnot Power Station were identified for possible development. During the Screening exercise six (6) of these were eliminated as either being too small or too close to the coal deposits and wetlands. Details of the three (3) remaining alternatives were considered in this report. These are referred to as Site 1; Site 3 and Site 4 **(Figure 5)**.

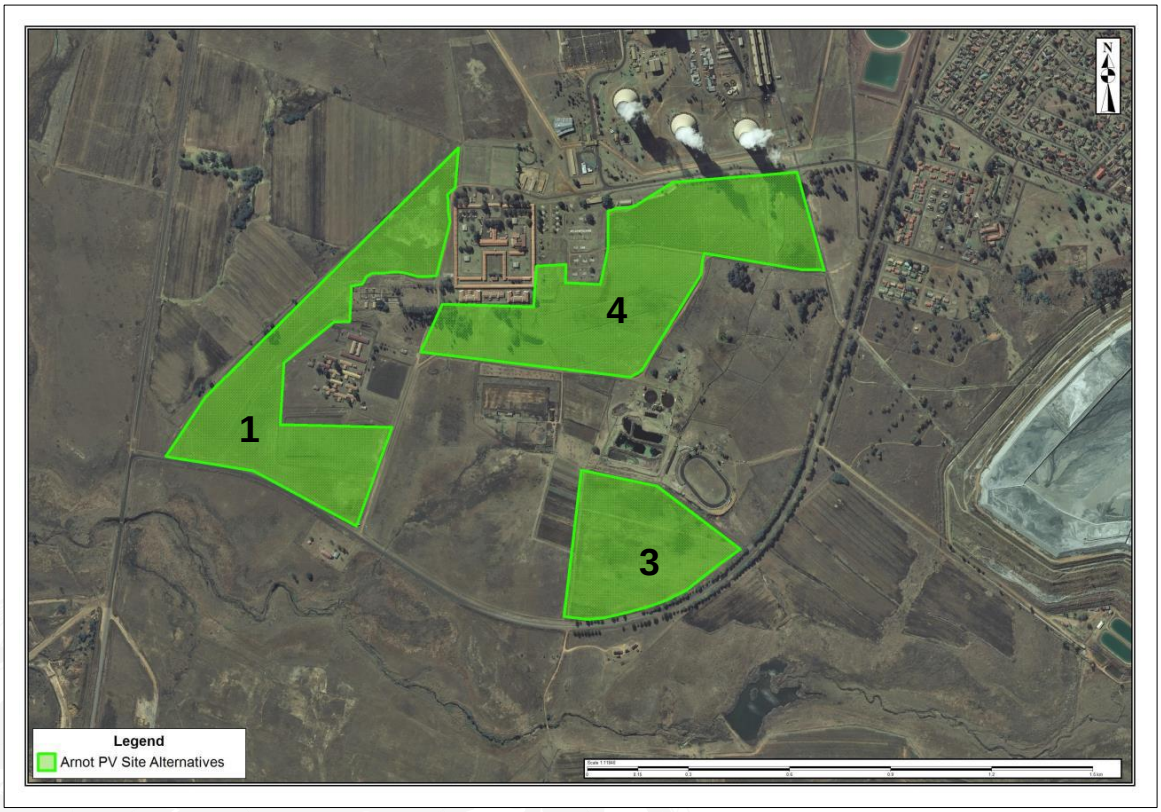

Figure 5: Site Screening Layout

5.1.1 Alternative Site 1

Alternative Site 1 has a footprint of 25.8 ha allowing for a projected power peak of 17.2 MWp. It is situated on Eskom owned property and can be characterised as having a fairly flat topography. The Power Station building adjacent to the site area could cause possible shading from the buildings. There is a suitable electrical point of connection for PV within the power station at the 11 kV station boards. The approximate distance to the point of connection is 2 km.

5.1.2 Alternative Site 3

Alternative Site 3 has a footprint of 14.4.ha allowing for a projected power peak of only 9.6 MWp. This is a smaller land area which will only trigger a Basic Assessment process. The proximity with a wetland will be further investigated in the EIA phase. The alternative site is also on Eskom owned property. The approximate distance to the point of connection is 2.2 km.

5.1.3 Alternative Site 4

Alternative Site 4 has a footprint of 32.6 ha allowing for a projected power peak of 21.7 MWp. The site is outside of the mediate power station security fence, and can be characterised as having flat topography. The Power Station building adjacent to the site area could cause possible shading from the buildings. The approximate distance to the point of connection is 1.5 km.

Following the public comment period Eskom Arnot power Station can no longer avail the land designated as Alternative Site 4. This alternative will therefore not be considered and assessed in the EIA phase. Only Alternative sites 1 and 3 will be further assessed.

6. PUBLIC PARTICIPATION IN THE SCOPING PHASE

6.1 OBJECTIVES OF THE SCOPING PHASE

The main objectives of the Scoping Study are to:

- Describe the key biophysical and socio-economic characteristics of the affected environment;
- Identify potential environmental issues and impacts to be addressed in the EIA phase;
- Define the legal, policy and planning context for the proposed project;
- Undertake a public participation process that provides opportunities for all interested and affected parties (I&APs) to be involved;
- Identify feasible alternatives that must be assessed in the EIA phase; and
- Define the Plan of Study for the EIA phase.

6.2 NOTIFICATION LETTERS, ON-SITE NOTICE AND BACKGROUND INFORMATION DOCUMENT

A letter notifying I&APs of this application for environmental authorisation, was sent to all registered stakeholders together with a Background Information Document (BID) (**Appendix B**). An on-site notice, providing a brief background on the project and contact details in order for I&APs to request further information and/or to register as a stakeholder was posted on the 16th January 2015 at the Arnot Power Station and Rietkuil Country Club **(Figure 6-7).** In addition hand deliveries of BIDS and Notification letters were undertaken around the Arnot Power Station. Receipts signed the BID response sheet as acknowledgment of the information received.

Figure 6: On site Notice at Arnot Power Station

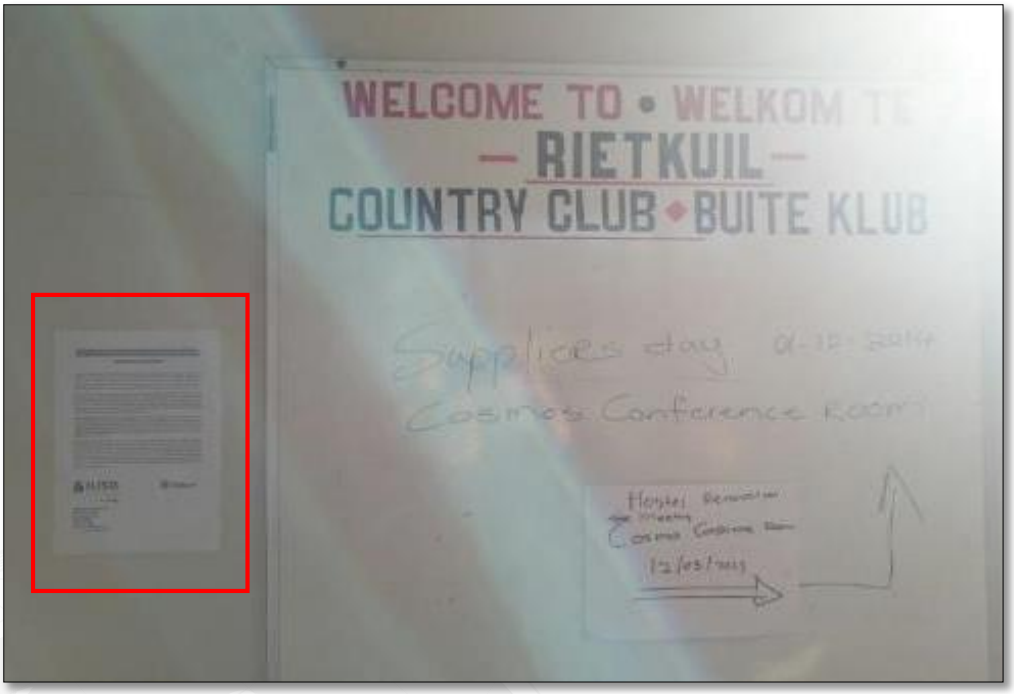

Figure 7: Notice at Rietkuil Country Club

6.3 ADVERTISEMENTS AND DRAFT REPORTS FOR COMMENT

Notice of the application was advertised in the Middelburg Observer on the 9th January 2015. The draft scoping report was available to I&APs for comment on the ILISO website (www.iliso.com) and hard copies were made available for perusal at the, Arnot Power Station security gate and environmental office as well as the Rietkuil Country Club. I&APs had thirty (30) days to comment on the draft scoping report. The comment period was from the 25th February 2015 to the 26th March 2015.

6.4 PUBLIC MEETINGS

Public meetings were held during the scoping phase to provide stakeholders with background information about the proposed project, and to give them the opportunity to raise issues and/or concerns that need to be addressed during the project. The meetings were held on the 12th March 2015 at the Rietkuil Country Club at 10:00am and 17:00pm to allow for all I&AP to contribute in the public participation process. No I&AP were in attendance at both meetings. All comments received during the comment period are recorded in the Issues and Responses Report (IRR) **(Appendix B).**

7. DESCRIPTION OF THE AFFECTED ENVIRONMENT

This section provides a description of the project area's climate and baseline environment and conditions.

7.1 SURFACE AND GROUND WATER RESOURCES

The site falls within the B12B water quaternary catchment in the Upper Olifants sub-area of the Olifants Water Management Area **(Figure 8)**.

7.2 CLIMATE

South Africa experiences some of the highest levels of solar radiation in the world. The average daily solar radiation in South Africa varies between 4.5 and 6.5 kWh/m^2 (DoE, Web 2). **Figure 9** shows the annual solar radiation for South Africa, which reveals considerable solar resource potential for solar photovoltaic power generation.

The study area displays warm summers and cold winters typical of the Highveld climate. The average summer and winter daytime temperatures are 25 ^{0}C and 20 ^{0}C, respectively. Rainfall occurs mainly as thunderstorms and drought conditions occur in approximately 12 % of all years. The Environmental Potential Atlas for Mpumalanga places rainfall at site as ranging between 621 mm and 750 mm per year. The prevailing wind direction is north-west during the summer and east during winter. Winds are usually light to moderate.

7.3 GEOLOGY

The study area is underlain by geology consisting of the Karoo Supergroup which consists of sedimentary and basalt rocks. It is a relatively young plateau system that is in the slow process of being removed by erosion from the sub-Karoo surface. The Ecca Group of the Karoo Supergroup contains bands of coal within the sedimentary layers. Alluvial deposits in the area consist of sand created by the weathering of older rocks. The composition of these small loose grains varies depending on the source of rock.

7.4 VEGETATION

The study area falls within the Mesic Highveld Grassland Bioregion (Mucina and Rutherford, 2006) (**Figure 10**). The Grassland Biome is found chiefly on the high central plateau of South Africa. The topography is mainly flat and rolling, but includes the escarpment itself. Altitude varies from near sea level to 2 850 m above sea level.

Grasslands are dominated by a single layer of grasses. The amount of cover depends on rainfall and the degree of grazing. Trees are absent, except in a few localized habitats. Geophytes (bulbs) are often abundant. Frosts, fire and grazing maintain the grass dominance and prevent the establishment of trees. The proposed sites can be characterised as grazing land

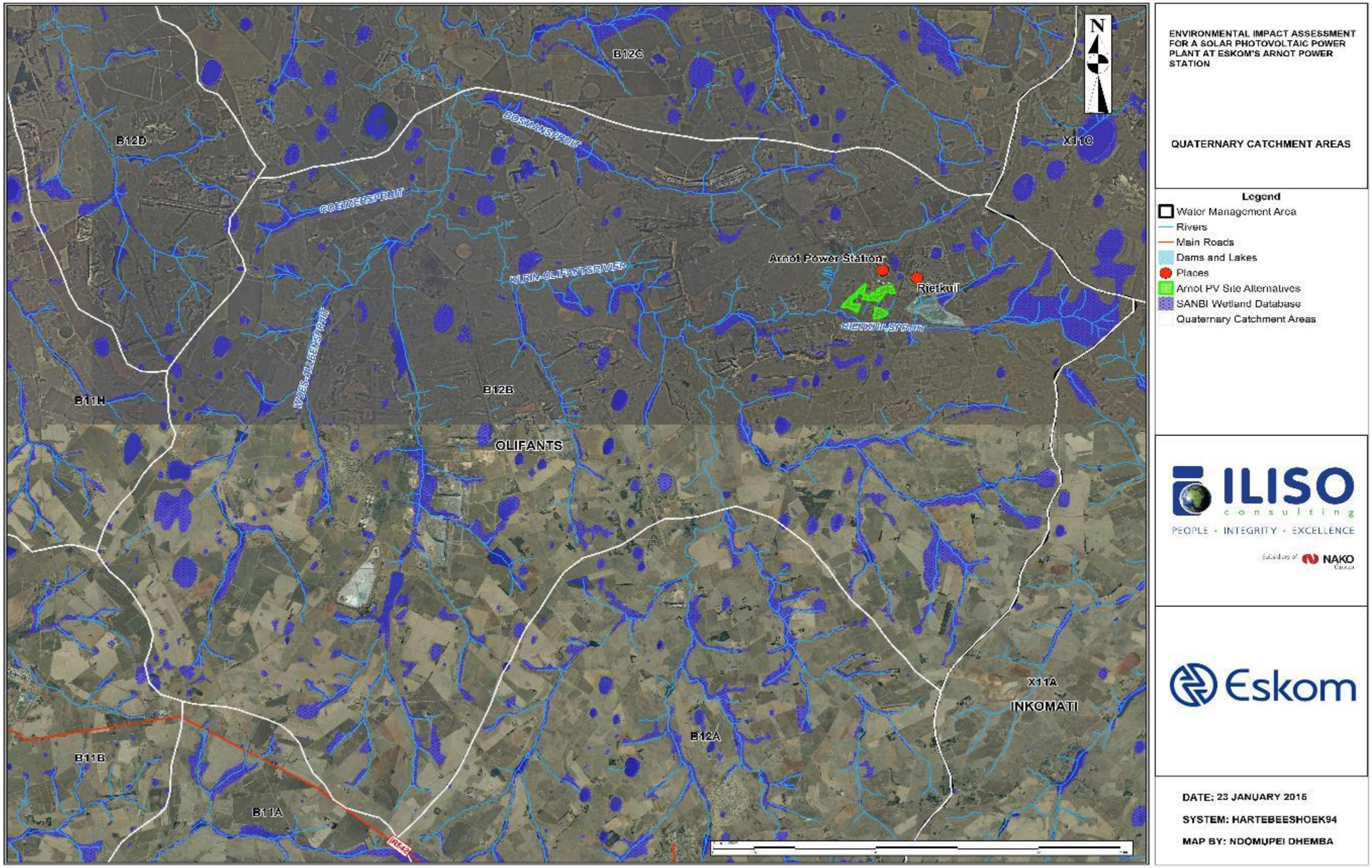

Figure 8: Quaternary Catchment of the Project Area

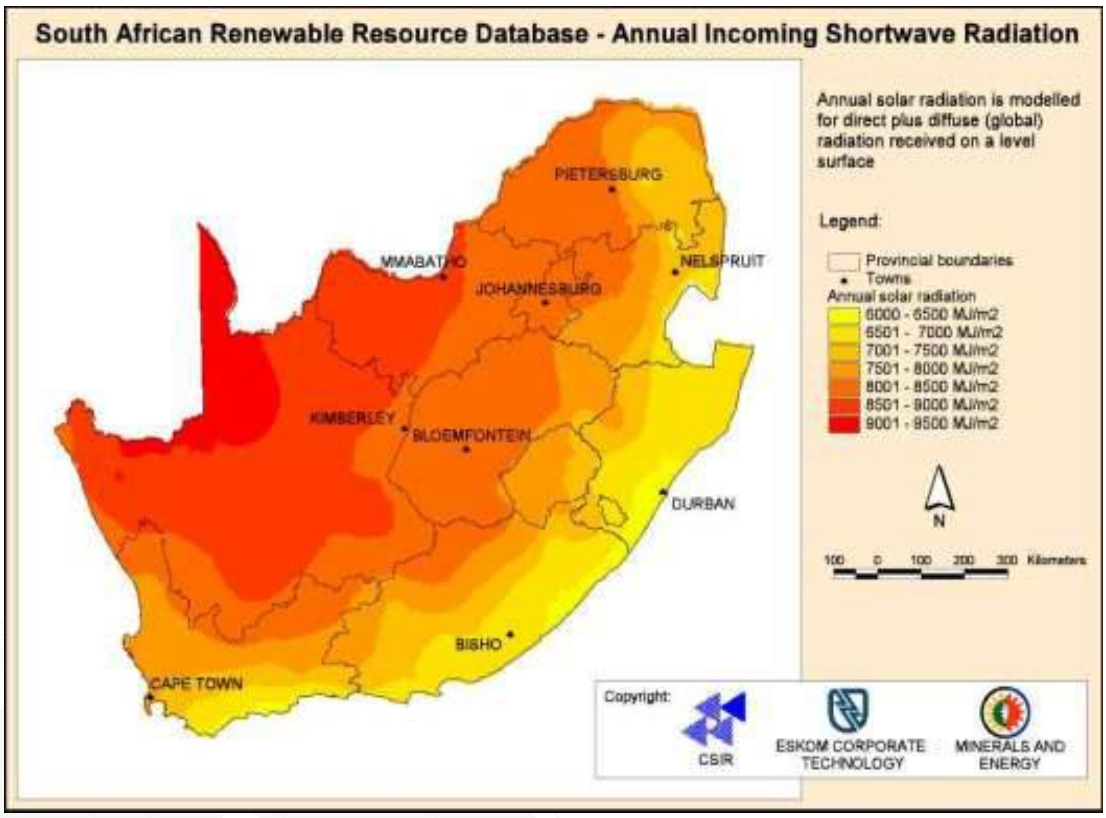

Figure 9: Annual direct and diffuse solar radiation (DoE, Web 2)

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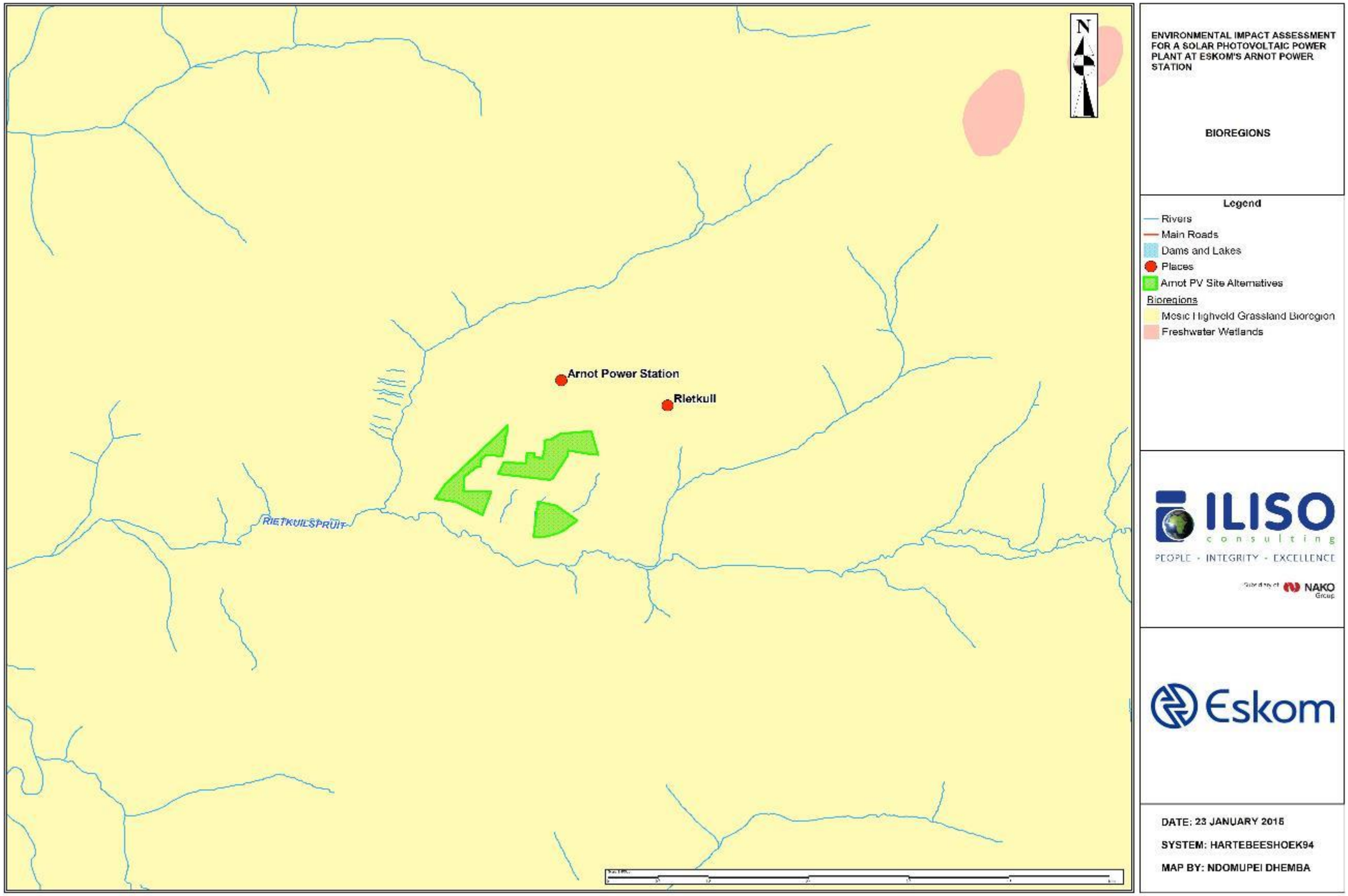

Figure 10: Bioregion map, showing vegetation in the study area

8. PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT

8.1 SCOPE OF THE EIA

The EIA will investigate the impacts of, and recommend mitigation and enhancement measures for the following:

- Alternative Site 1, has a footprint of 25.8 ha allowing for a projected power peak of 17.2 MWp. This will include the construction camp and all associated infrastructure.
- Alternative Site 3 has a footprint of 14.4.ha allowing for a projected power peak of 9.6 MWp. This will include the construction camp and all associated infrastructure.
- An access road wider than eight (8) metres and where no reserve exists, an access road will be constructed to gain access to the proposed Solar PV site.

8.2 PROPOSED APPROACH

The EIA will build on the Scoping Report and will focus on assessing the key impacts, determining their significance, and recommending appropriate measures to mitigate negative impacts and enhance benefits. Where required, this will involve specialist input.

The contents of the EIR will be as prescribed in the EIA Regulations, 2010 (Regulation 31(2)).

8.3 SPECIALIST STUDIES

Some of the key issues identified during the Scoping Phase will require further investigation by appropriately qualified and experienced specialists. The specialist studies to be undertaken during the EIA phase are detailed below. These studies will be synthesised and integrated into the overall impact assessment (full reports will be included as appendices to the EIR), and recommendations for mitigation will be included in the EMPr. The contents of all specialist reports will include information as prescribed in Regulation 32(3) of the EIA Regulations, 2010 and will provide preference ranking of the sites.

8.3.1 Flora Assessment

The flora assessment will be undertaken by a desktop review of distribution lists (including Red Data species) and available literature will be conducted for the vegetation. The vegetation type of the area will be defined according to Mucina and Rutherford (2006). Extensive consideration will also be given to determining the ecological importance and sensitivity (EIS) of the subject property according to the Biodiversity GIS (BGIS) and SIBIS databases. The SANBI and PRECIS databases for the QDS will also be consulted.

The site assessment will include a detailed assessment of the final layout as well as the surrounding zone of influence. Results will be compared to a suitable reference site if the proposed area is already significantly disturbed. The scope of work for the vegetation assessment will include:

- Various habitat types;

- A description of each habitat type based on conservation importance and present ecological state;
- Floral species associated with each habitat component;
- Focus on sensitive habitat types and impacts associated to them;
- Focus will also be given to identifying areas of severe alien and invader encroachment;
- Medicinal plant species will be identified;
- Veld condition will be quantitatively assessed according to a pre-defined veld condition index and will also be compared to the typical vegetation for the vegetation type of the area according to Mucina and Rutherford (2006);
- Sensitive areas will be mapped where detail will be given of the ecological aspect of concern in each sensitivity zone;
- Specific focus will also be given to establishing the presence of Red Data Lists (RDL) and protected plants as listed for the Mpumalanga Province as well as the threatened and protected species regulations, as specified in the National Environmental Management: Biodiversity Act (NEMBA) (Act No 10 of 2004). Community densities observed during the field assessment will be mapped and will feed into the overall site sensitivity map. Attention will also be afforded to applicable legislative requirements regarding permit application;
- An assessment of general impacts as well as cumulative impacts on floral assemblages in the region will also be made;
- Rating of sites based on preference; and
- Recommendations on management and mitigation measures (including opportunities and constraints) with regards to the construction and operation of the proposed development in order to manage and mitigate impacts on the faunal assemblage of the area.

8.3.2 Faunal Assessment

The Faunal Assessment will be undertaken by extensive consideration will be given to determining the ecological importance and sensitivity (EIS) of the subject property according to the Biodiversity GIS (BGIS), any national or provincial fine scale plans applicable to the region as well as the National Spatial Biodiversity Assessment. Distribution and preferred habitat of faunal species listed within the SIBIS and IUCN databases will also be noted. Taxa specific lists will also be compiled with the use of databases such as SAFAP and SARCA.

The scope of work for the faunal assessment will include:

- Visual observations of actually occurring species;
- Identification of evidence of occurrence, e.g. call spoor, droppings etc;
- Capture of fauna by various methods including netting, trapping and dragging, if deemed necessary. In this regard special mention is made of the use of pitfall traps and sweep netting for invertebrates as well as the use of Sherman traps to determine the composition of the small mammal community on the site;

- Nocturnal studies to identify nocturnal animals in the area may take place if it is deemed necessary;
- The reports produced will include sensitive habitat types and impacts from habitat disturbance, faunal assemblages at risk and an assessment of impacts on migratory routes;
- An assessment of cumulative impacts on faunal assemblages in the region will also be made;
- The RDSIS index will also be considered in order to quantify the importance of the subject property in terms of RDL faunal conservation;
- Based on the findings a detailed impact assessment on all identified significant risks will take place; and
- Recommendations on management and mitigation measures (including opportunities and constraints) with regards to the construction and operation of the proposed development in order to manage and mitigate impacts on the faunal assemblage of the area.

8.3.3 Avifaunal Assessment

Extensive consideration will be given to determining the EIS of the development according to the BGIS, any national or provincial fine scale plans applicable to the region as well as the National Spatial Biodiversity Assessment. Distribution and preferred habitat of avifaunal species listed within the SIBIS and IUCN databases will also be noted. Taxa specific lists will also be compiled with the use of databases such as SABCA Coordinated Avifaunal Road count (CAR) data and SABAP. Attention will also be afforded to EIA reports and any subsequent monitoring reports on the potential impacts on birds.

- Avifaunal assemblage will be determined using the following methods:
  - A complete potential avifaunal list will be provided;
  - Species will be identified through direct visual observations, call identification or by other means (e.g. owl pellet identification);
  - Habitat evaluations will be undertaken for suitability for supporting various RDL species recorded from the region, which will be extended to 500 m surrounding the development area;
  - The conservation status of each species listed will be determined;
  - The potential species list in accordance to the habitat availability will also be compiled;
  - The species recorded during the field survey will be listed;
  - Habitat evaluations will be undertaken for suitability for supporting various RDL species recorded from the region; and
  - Identification through call identification and direct observation.
- The report produced will include sensitive habitat types and impacts from habitat disturbance, avifaunal assemblages at risk and an assessment of impacts on migratory routes;

- The Red Data Sensitivity Index Score (RDSIS) will also be considered in order to quantify the importance of the study area in terms of RDL avifaunal conservation with special mention of the avifaunal species listed within the National Environmental Management Biodiversity Act and the provincial RDL/protected lists;
- The general effects of the proposed development on migratory routes of birds as well as ecological connectivity will be addressed and the migratory connectivity of the ecologically sensitive habitat types will be assessed;
- Based on the findings during the baseline studies, a detailed impact assessment on all identified significant risks will take place including cumulative impacts on the avifaunal assemblage in the region;
- Recommendations on management and mitigation measures (including opportunities and constraints) with regards to the construction and operation of the proposed development in order to manage and mitigate impacts on the ecology of the area will be provided; and
- The results of the impact assessment will be included into the original baseline study in order to develop a comprehensive ecological impact assessment study, and attention will also be afforded to monitoring requirements as deemed necessary.

8.3.4 Wetland Assessment

A desktop study will be compiled with all relevant information as presented by the SANBI's Biodiversity GIS website (http://bgis.sanbi.org) as well as location of Freshwater Ecosystem Priority Areas (FEPAs) in relation to the study area.

A site assessment will be undertaken and wetland features identified within the study area assessed using the following methodology:

- Delineation of the wetland features will take place according to "DWAF, 2005: A practical Guideline Procedure for the Identification and Delineation of Wetlands and Riparian Zones". Aspects such as soil morphological characteristics, vegetation types and wetness will be used to verify the delineation of the various zones of the wetland (permanent and temporary) according to the guidelines;
- All wetland features identified will be mapped using a handheld Global Positioning System (GPS) and the use of ARC GIS 10.1 software. A buffer zone will be allocated to each wetland feature;
- The wetland services provided by the resources within the study area as well as surroundings will be assessed according to the Method of Kotze *et al* (2008) in which services to the ecology of the site will be defined and services to the people of the area will be defined;
- The wetland Present Ecological State (PES) will be assessed according to indices such as the Wetland Index for Habitat Integrity;
- The EIS will be determined according to the method as adapted from DWA (1999) for floodplains;

- The wetland areas will be mapped according to the ecological sensitivity of each wetland area in relation to the study area;
- Results will be compiled into a report which will include a discussion on the findings;
- Based on the findings during the wetland study, a detailed impact assessment on all identified significant risks will take place including cumulative impacts on wetland assemblages in the region; and
- Recommendations on management and mitigation measures (including opportunities and constraints) with regards to the development and operation of the proposed development in order to improve, manage and mitigate impacts on the wetland ecology of the area will be provided.

8.3.5 Heritage Impact Assessment

The study would consist of:

- A screening/feasibility process to determine potential fatal flaws of the site; and
- A full heritage impact of the site.

The report that will be included in the EIR and submitted to the heritage authorities will consist of:

- Identifying of possible archaeological, cultural and historic sites within the proposed development area;
- Evaluate the potential impacts of construction, operation and maintenance of the proposed development on archaeological, cultural and historical resources; and
- Recommend mitigation measures to ameliorate any negative impacts on areas of archaeological, cultural or historical importance.

The deliverables will be:

- A full HIA report that includes built environment issues as well as archaeology.

The assessment will consist of a literature review and a field survey. This is detailed as follows:

Literature Review

- A survey of the available literature would be done in order to review previous research and to determine the potential of the area;
- Various databases would be consulted, including the SAHRA national site register, the Heritage Atlas Database, ENPAT, local heritage associations, etc; and
- Local knowledge, e.g. people working in the field of heritage conservation or utilisation, museums and universities would be accessed.

Field survey/Site visit
The total area would be inspected. Normally, a number of parallel transects would be walked over the site and all sites, features and objects identified would be recorded.

Documentation
All sites, objects and structures that are identified are documented according to the general minimum standards accepted by the archaeological profession. Coordinates of individual localities are determined by means of a GPS and plotted on a map.

8.3.6 Soils and agricultural potential Assessment

The soils and agricultural potential study will entail a desktop study using a 1:250 000 land type information. The specialist will conduct an impact assessment and recommend mitigation measures to minimise the negative impacts.

8.3.7 Social Impact Assessment

The Social Impact Assessment will be conducted in the following stages:

- Step 1: Study inception and delineation;
- Step 2: Social Base conditions;
- Step 3: Impact identification; and
- Step 4: Mitigations.

Each step undertaken in this study is briefly outlined below.

Step 1: Study inception and delineation
The purpose of this is to delineate the study area. The study area and potential areas of impact will be delineated into primary, secondary and tertiary areas of investigation. The surrounding areas and communities/villages refer to the secondary area of investigation and the tertiary area of investigation refers to the broader area, major towns, municipal areas and district that will be socially impacted by the proposed study. A site visit will be undertaken to each of the sites.

Step 2: Social Base Conditions
The purpose of this step is to determine the social status of the study area and areas of impact, by compiling social profiles of the areas. The social profile will entail a discussion of the micro and macro social structure and includes aspects such as household size, household income, population, growth rate, employment, labour composition, etc.

The objective of the analysis will be to provide a detailed assessment on the options identified, in terms of social implications. The profile of the area will entail determining desktop social characteristics of the study area.

A study of this nature needs to slot into the existing hierarchy of policies and legislation legally promulgated throughout the area. The studies/policies regarding development objectives and future plans in the region, e.g. the Spatial Development Frameworks, the Integrated Development Plan, Regional objectives, planned initiatives for the area, etc will be critically reviewed and analysed.

The profile of the area will entail determining desktop social characteristics of the study area. This will include reference to:

- Size of affected population;,
- Access to services and social amenities;
- Sources of employment;
- Sector of employment;
- Activities and uses of activities;
- Sectoral production;
- Employment and labour composition;
- Level of education; and
- Income levels.

The profile of the area will be compiled by utilising existing data, such as Census 2011, quantec data, other tourism and socio-economic studies, inspection of the affected areas as well as review of issues and concerns/issues raised during public participation.

Step 3: Impact identification and quantification

The purpose of this step is to identify and quantify the possible social impacts of the proposed PV plants during construction, operation, and decommissioning. The identified impacts will be assessed in terms of nature, extent, duration, intensity, frequency of occurrence, and probability, and will include reference to both positive and negative impacts.

An informed qualitative perspective will be given on the following aspects relating to the physical construction of the infrastructure:

- Habitat modification and destruction;
- Social structure and cohesion disturbances and residential impacts;
- Displacements/relocations;
- Visual impairments and aesthetic impacts;
- Possible dangers during and after construction, e.g. loss of local access;
- Employment and procurement issues: opportunities for local residents and business to participate in the construction process and beyond, skills transfer and training during employment, etc;
- Change in occupational opportunities;
- Availability of appropriately qualified workers;
- Change in sense of place;
- Change in access to resources that sustain livelihoods;
- Decrease in safety and security related burdens;
- Community upliftment;
- Technology transfer;
- Human capacity and skills transfer development;
- Free up time from obtaining electricity and obstacles to economic development;
- Decrease economic decline related to electricity shortages (if applicable);
- Provide essential final good and opening up additional household end-uses; and

- An informed qualitative perspective will also be provided on the impacts as well as those impacts which are not quantifiable such as the welfare consequence, etc. The main purpose of this will be to understand the magnitude and scope of the impact of renewable energy on communities and social development.

Step 4: Mitigations

The purpose of this step is to provide guidelines to minimise any negative impacts, as well as guidelines to maximise the positive social impacts. The management and mitigation options include identifying alternative ways of meeting needs, bringing about changes in plans, improving monitoring and management, improving negative perceptions, etc. The management guidelines will be detailed in order to provide an exact account of what should be done, how it should be done, what the consequences will be, etc.

The management plans will provide clear strategies for monitoring and mitigation of impacts, be practical, realistic and possible to implement, be supported by targets, actions and steps for implementation, and responsibilities for mitigation, etc. These will be included in the EMPr.

8.4 IMPACT ASSESSMENT METHODOLOGY

The key issues identified during the Scoping Phase inform the Terms of Reference (ToR) for the specialist studies, as summarised above. Each issue consists of components that, on their own or in combination with each other give rise to potential impacts, either positive or negative, from the project onto the environment or from the environment onto the project. In the EIA the significance of the potential impacts will be considered before and after identified mitigation is implemented, for direct, indirect, and cumulative impacts, in the short and long term.

A description of the nature of the impact, any specific legal requirements and the stage (construction/decommissioning or operation) will be given. Impacts are considered to be the same during construction and decommissioning.

The following criteria will be used to evaluate significance:

- **Nature:** This is an appraisal of the type of effect the activity is likely to have on the affected environment. The description includes what is being affected and how. The nature of the impact will be classified as positive or negative, and direct or indirect.

- **Extent and location:** This indicates the spatial area that may be affected **(Table 6)**

Table 6: Geographical extent of impact

Rating	Extent	Description
1	Site	Impacted area is only at the site – the actual extent of the activity.
2	Local	Impacted area is limited to the site and its immediate surrounding area
3	Regional	Impacted area extends to the surrounding area, the immediate and the neighbouring properties.
4	Provincial	Impact considered of provincial importance
5	National	Impact considered of national importance – will affect entire country.

- **Duration:** This measures the lifetime of the impact (**Table 7**).

Table 7: Duration of Impact

Rating	Duration	Description
1	Short term	0 – 3 years, or length of construction period
2	Medium term	3 – 10 years
3	Long term	> 10 years, or entire operational life of project.
4	Permanent – mitigated	Mitigation measures of natural process will reduce impact – impact will remain after operational life of project.
5	Permanent – no mitigation	No mitigation measures of natural process will reduce impact after implementation – impact will remain after operational life of project.

- **Intensity/severity:** This is the degree to which the project affects or changes the environment; it includes a measure of the reversibility of impacts (**Table 8**).

Table 8: Intensity/severity

Rating	Intensity	Description
1	Negligible	Change is slight, often not noticeable, natural functioning of environment not affected.
2	Low	Natural functioning of environment is minimally affected. Natural, cultural and social functions and processes can be reversed to their original state.
3	Medium	Environment remarkably altered, still functions, if in modified way. Negative impacts cannot be fully reversed.
4	High	Cultural and social functions and processes disturbed – potentially ceasing to function temporarily.
5	Very high	Natural, cultural and social functions and processes permanently cease, and valued, important, sensitive or vulnerable systems or communities are substantially affected. Negative impacts cannot be reversed.

- **Potential for irreplaceable loss of resources:** This is the degree to which the project will cause loss of resources that are irreplaceable (**Table 9**).

Table 9: Potential for irreplaceable loss of resources

Rating	Potential for irreplaceable loss of resources	Description
1	Low	No irreplaceable resources will be impacted.
3	Medium	Resources can be replaced, with effort.
5	High	There is no potential for replacing a particular vulnerable resource that will be impacted.

- **Probability:** This is the likelihood or the chances that the impact will occur **(Table 10).**

Table 10: Probability of Impact

Rating	Probability	Description
1	Improbable	Under normal conditions, no impacts expected.
2	Low	The probability of the impact to occur is low due to its design or historic experience.
3	Medium	There is a distinct probability of the impact occurring.
4	High	It is most likely that the impact will occur
5	Definite	The impact will occur regardless of any prevention measures.

- **Confidence:** This is the level of knowledge or information available, the EAP or a specialist had in his/her judgement (**Table 11**).

Table 11: Confidence in level of knowledge or information

Rating	Confidence	Description
	Low	Judgement based on intuition, not knowledge / information.
	Medium	Common sense and general knowledge informs decision.
	High	Scientific / proven information informs decision.

- **Consequence:** This is calculated as extent + duration + intensity + potential impact on irreplaceable resources.
- **Significance:** The significance will be rated by combining the consequence of the impact and the probability of occurrence (i.e. consequence x probability = significance). The maximum value which can be obtained is 100 significance points (**Table 12**).

Table 12: Significance of issues (based on parameters)

Rating	Significance	Description
1-14	Very low	No action required.
15-29	Low	Impacts are within the acceptable range.
30-44	Medium-low	Impacts are within the acceptable range but should be mitigated to lower significance levels wherever possible.
45-59	Medium-high	Impacts are important and require attention; mitigation is required to reduce the negative impacts to acceptable levels.
60-80	High	Impacts are of great importance, mitigation is crucial.
81-100	Very high	Impacts are unacceptable.

- **Cumulative Impacts:** This refers to the combined, incremental effects of the impact. The possible cumulative impacts will also be considered.
- **Mitigation:** Mitigation for significant issues will be incorporated into the EMP.

8.5 ENVIRONMENTAL MANAGEMENT PROGRAMME

Based on the findings of the EIR, a practical and feasible EMPr will be compiled. The EMPr will outline how negative environmental impacts will be managed and minimized, and how positive impacts will be maximised, during and after construction. The EMPr will fulfil the requirements of GN 543 and will include mitigation measures required during the planning, construction and operational phases of the project as well as a framework for social and environmental monitoring. Recommendations will be given with regard to the responsible parties for the implementation of the EMPr.

8.6 PUBLIC PARTICIPATION PROCESS

Public participation in an EIA plays a critical role in integrating economic, social and environmental objectives. It assists in moving towards more sustainable development through strengthening and increasing public awareness of the economic and environmental trade-offs, minimizing or avoiding public controversy, confrontation and delay, and assists with obtaining traditional and local information about the project and the project area.

ILISO will provide feedback to stakeholders throughout the process. I&APs and the public will be informed of the availability of the draft EIA report (through written notification to registered stakeholders), as well as of the authorities' decision and the appeal process in respect of the various applications (through newspaper advertisement and written notification to all registered stakeholders).

The draft reports will be distributed to public places and made available for a 30 calendar day public comment period. The draft reports will also be presented at stakeholder meetings, where I&APs will be able to confirm that their issues have been captured correctly, properly understood by the environmental team, and included in the specialist studies and impact assessment. The final documents will be made available for public comment for a 21 calendar day public comment period and be

submitted to the authorities. Draft and final reports will be made available for download on the ILISO website (www.iliso.com).

All issues and comments received from the stakeholder consultation process will be captured in an Issues and Responses Report (IRR) that will form an Appendix to the EIA Report.

8.7 PROGRAMME

A fast-tracked process is being implemented due to the urgency in securing additional electricity supply. This fast-tracked programme will not compromise the legislated EIA process. Specialists will however have to commence with their studies prior to acceptance of the PoS for EIA by DEA.

The key milestones in the EIA process are summarised below:

- Public comment period for final Scoping report and submission of final Scoping report to DEA: April 2015;
- EIA phase (including specialist studies): May– September 2015;
- Public comment period for draft EIR and EMP: August 2015; and
- Submission of final EIR: October 2015.

9. CONCLUSION AND RECOMMENDATIONS

The main aim of the proposed PV plant at Eskom's Arnot Power Station is to enable Eskom to diversify their energy mix and reduce their carbon footprint. Even though the proposed project will be used for Eskom's own consumption at Arnot Power Station it will allow Eskom to increase its electricity export to the grid. In doing so, this will enable Eskom to support the demand side management energy efficiency programme and contribute to South Africa being able to meet some of its international obligations by aligning domestic policy with internationally agreed strategies and standards.

As per the requirements of the NEMA (Act 107 of 1998), this scoping investigation has reviewed project alternatives and highlighted the potential environmental impacts associated with the proposed installation of the PV Plant. Environmental impacts of the project have been identified and will be further investigated and assessed in the EIA phase.

The project team has the necessary experience and skills to carry out the EIA process (including specialist studies) required and it is recommended that the EIA process proceeds based on the proposed Plan of Study for EIA.

10. REFERENCES

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