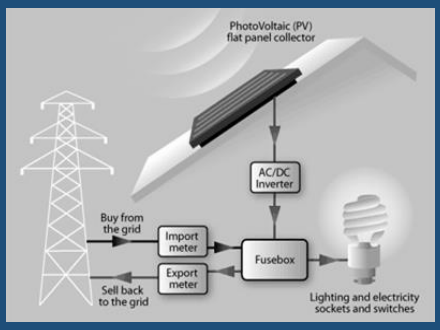

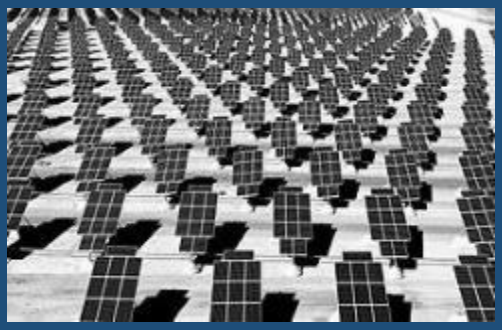

Social Impact Assessment for the Installation of Solar Photovoltaic Power Plant at Arnot Coal fired Power Station

May 2015

Prepared for:

ILISO consulting

Prepared by:

Kayamandi Development Services

EXECUTIVE SUMMARY

ILISO Consulting (Pty) Ltd was appointed by Eskom Holdings SOC Limited as the lead consultants to manage the Environmental Impact Assessment (EIA) process for the establishment of the proposed photovoltaic (PV) power plant and associated infrastructure at the premises of Arnot Power Station within the Mpumalanga Province. Kayamandi Development Services (Pty) Ltd has been appointed as sub-consultants by ILISO Consulting (Pty) Ltd to undertake the social assessment for the proposed Solar Photovoltaic (PV) Power plant on behalf of Eskom Holdings SOC Limited.

The purpose of this assessment is to analyse all the factors in order to provide an unbiased assessment of the potential social impacts of the proposed installation of Solar Photovoltaic (PV) Power Plant at Arnot Power Station, in Mpumalanga. The report presents the potential prospects and constraints that would arise as a result of the implementation of this project.

Arnot Power Station in Mpumalanga, South Africa, is a coal-fired power plant operated by Eskom. The Power Station is situated in the Steve Tshwete Local Municipality (LM) that falls under the Nkangala District Municipality (DM) of the Mpumalanga Province. The Arnot Power Station and associated cooling towers are a prominent feature within the landscape which engenders an industrial component to the landscape. The southern and south-western regions of the Nkangala DM form part of an area known as South Africa's energy Mecca because of the vast amounts of coal and coal-produced power in the region.

Socially, the Municipality is found to have the following general characteristics:

- Mining activities contribute significantly to local economic production
- A large percentage of the population is living on the poverty line as a result of high unemployment rate, low levels of education and skills, and low income levels, on par with that of the country as a whole
- The nearby Rietkuil settlement and the Rietkuil mine hostels is situated within the immediate vicinity
- Surrounding land uses are mostly mining and agriculture
- Solar energy production is supported by policy and local planning environment and the LM considers it critical to create energy that considers renewable and non-renewable energy sources

A summary of the social impacts and their significance, pre and post mitigation are set out below.

IMPACTS	PHASES	WITHOUT MITIGATION				WITH MITIGATION			
		Planning	Construction	Operational	Decommissioning	Planning	Construction	Operational	Decommissioning
New business sales, multipliers and economic stimulation		L	M	L		L	M	L	
Employment and skills transferral		L	M	L	N	L	M	L	L
In-migration on social dynamics and pressure on services			L				L/N		
Health, safety and security			L	L			L/N	N	

IMPACTS	PHASES	WITHOUT MITIGATION				WITH MITIGATION			
		Planning	Construction	Operational	Decommissioning	Planning	Construction	Operational	Decommissioning
Nuisance, noise, and change in quality of living environment			L					L	
Change in visual, land use patterns, and sense of space			M	M	L		L	L	L
Impact on Arnot residents			M	M	L		M	L	
Agricultural compatibility			L	L/N	L		L	L/N	L
Development of clean renewable energy				M				M	

From a social perspective it is concluded that both positive and negative social impacts have been identified.

With regards to site alternatives, from a social perspective, site alternative 3 is slightly preferable in that its location provides the least negative impacts. However, site 3 also provides by far the least positive impacts. The positive impacts are identified as outweighing the negative impacts, which is why site 1 is preferred. Should edusec be completely demolished perhaps site 1 offers the best alternative, especially since it could either utilise greater space with potentially greater positive impacts, or it could utilise the edusec space instead of the northern tip of site1 so that the activity is not directly adjacent Arnot residents.

The project involves no sacrifice of agricultural productive capacity and provides a significant source of additional income while introducing relatively minimal risks with adequate mitigation. Minimal negative impacts are anticipated on tourism and other activities on surrounding farms, although all activities will be able to continue as at present.

The assessment of the key issues indicated that there are no negative impacts that can be classified as fatal flaws and which are of such significance that it cannot be successfully mitigated. Stated differently, the proposed development is unlikely to result in any permanent damaging social impacts.

Based on the social assessment, the following general conclusions and findings can be made:

- The potential negative social impacts associated with the construction phase are typical of construction related projects. The construction related activities that have the potential to cause social impacts are mostly of a low magnitude and can be reduced with the implementation of the mitigation measures proposed.
- The potential negative impact associated with the operation phase is that the Solar Energy Facility could have a moderate impact on residents or Arnot.
- New business sales and employment opportunities will be created in the construction and operation phase and the impact is rated as positive even if only a relatively few individuals, possibly not locals from the immediate surroundings, will benefit in this regard.
- The proposed project has the potential to assist the local South African economy in creating entrepreneurial development, albeit very limited, especially if local business could be involved in the provision of general material and services during the construction and operational phases.

- The proposed development also represents an investment in infrastructure for the generation of clean, renewable energy, which, given the challenges created by climate change, represents a positive social benefit for society as a whole.

When considering the overall costs and benefits of the project it is found that the latter is more prominent allowing for the achievement of a net benefit. With respect to risks and negative impacts, these should prove relatively low with mitigation, with the exception of the construction phase impact on Arnot residents. The aforementioned should however prove acceptable provided adequate mitigation is put in place.

It is therefore recommended that the proposed Solar PV plant be supported, subject to the implementation of the recommended enhancement and mitigation measures contained in the report. In other words, in terms of the potential social impacts arising from the project, it is found that there is no obvious reason for the competent authority to reject the application on social grounds.

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ACRONYMS

AC	Alternating Current
BBBEE	Broad-Based Black Economic Empowerment
CSP	Concentrated Solar Power
DC	Direct Current
DEA	Department of Environmental Affairs
DM	District Municipality
EIA	Environmental Impact Assessment
GDP-R	Gross Domestic Product per Region
GHG	Green House Gas
IDP	Integrated Development Plan
IPAP	Industrial Policy Action Plan
IPP	Independent Power Producer
IRP	Integrated Resource Plan
LED	Local Economic Development
LM	Local Municipality
MEGDP	Mpumalanga Economic Growth and Development Path (MEGDP)
NDP	National Development Plan
NGPF	New Growth Path Framework
NIPF	National Industrial Policy Framework
NSDP	National Spatial Development Perspective
PGDS	Provincial Growth and Development Strategy
PSDF	Provincial Spatial Development Framework
PV	Photovoltaic
REIPP	Renewable Energy Independent Power Procurement Process
SDF	Spatial Development Framework
SEF	Solar Energy Facility
SIA	Social Impact Assessment
SP	Sub place
SPLUMA	Spatial Planning and Land Use Management Act
STD	Sexually Transmitted Diseases

ABBREVIATIONS

Km	Kilometers
Km^2	Square Kilometers
KWh	Kilowatt-hour
KV	Kilovolts
MWp	Mega Watt peak
m	Meters
Ha	Hectare

GLOSSARY

- **Alternatives**: Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process or technology alternatives, temporal alternatives or the 'do nothing' alternative.
- **Cumulative impacts**: Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.
- **Direct impacts**: Direct economic impacts are the changes in local business activity occurring as a direct consequence of public or private business decision, or public programmes and policies.
- **Environmental Management Plan**: An operational plan that organises and coordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its on-going maintenance after implementation.
- **Indirect impacts**: This effect may also be referred to as 'supplier impact'. The implementation of the renewable energy is expected to increase demand for products and services from suppliers.
- **Induced impacts**: Induced impact may also be referred to as 'consumer/household impact'. An example is the increased level of incomes that may be attained by employees who, as a result, would increase their demand for goods and services.
- **Interested and affected party**: Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups, and the public.
- **Sense of place**: The combination of characteristics and distinctive quality that makes a particular place unique and distinctive. Sense of place involves the human experience in a landscape, the local knowledge and culture. Sense of place also grows from identifying oneself in relation to a particular piece of land.

1. INTRODUCTION

1.1 STUDY OBJECTIVE

The purpose of this assessment is to analyse all the factors in order to provide an unbiased assessment of the potential social impacts of the proposed installation of Solar Photovoltaic (PV) Power Plant at Arnot Coal fired Power Station, in Mpumalanga. The report presents the potential prospects and constraints that would arise as a result of the implementation of this project.

ILISO Consulting (Pty) Ltd was appointed by Eskom Holdings SOC Limited as the lead consultants to manage the Environmental Impact Assessment (EIA) process for the establishment of the proposed photovoltaic (PV) power plant and associated infrastructure at the premises of Arnot Power Station within the Mpumalanga Province. The proposed development is situated on Eskom owned land. See figure 1 below.

Kayamandi Development Services (Pty) Ltd has been appointed as sub-consultants by ILISO Consulting (Pty) Ltd to undertake the social assessment for the proposed Solar Photovoltaic (PV) Power plant on behalf of Eskom Holdings SOC Limited. Russell Aird and Nanja Churr, the specialist consultants from Kayamandi Development Services (Pty) Ltd, responsible for undertaking the study and compiling the report, are independent and do not have vested or financial interests in the proposed project being either approved or rejected.

1.2 PROJECT LOCATION

Arnot Power Station in Mpumalanga, South Africa, is a coal-fired power plant operated by Eskom. The Power Station is situated in the Steve Tshwete Local Municipality (LM) that falls under the Nkangala District Municipality (DM) of the Mpumalanga Province. The southern and south-western regions of the Nkangala DM form part of an area known as South Africa's energy mecca because of the vast amounts of coal and coal-produced power in the region.

The Steve Tshwete LM is one of six local municipalities in the Nkangala DM (Thembisile Hani; Dr SJ Moroka; eMalahleni; Victor Khanye; and eMakhazeni). Steve Tshwete LM is located in the centre of the Nkangala District, approximately 150km east of Pretoria on route to Mbombela, and covers approximately 3 997 km². The municipality is traversed by the Maputo Development Corridor, the Middelburg / Steelpoort mining resource link, as well as the Middelburg / Bethal/ Ermelo/ Richards Bay Corridor. A number of National and Provincial roads also run through the area.

A separate specialist Power Stations Site Screening report was compiled and at the Arnot Power Station, two site alternatives, namely site 1 and 3, out of a possible 9 sites on Eskom owned property have been identified as the proposed sites requiring investigation. See figure 2 below.

Figure 1: Arnot Power Station and proposed PV sites locality map

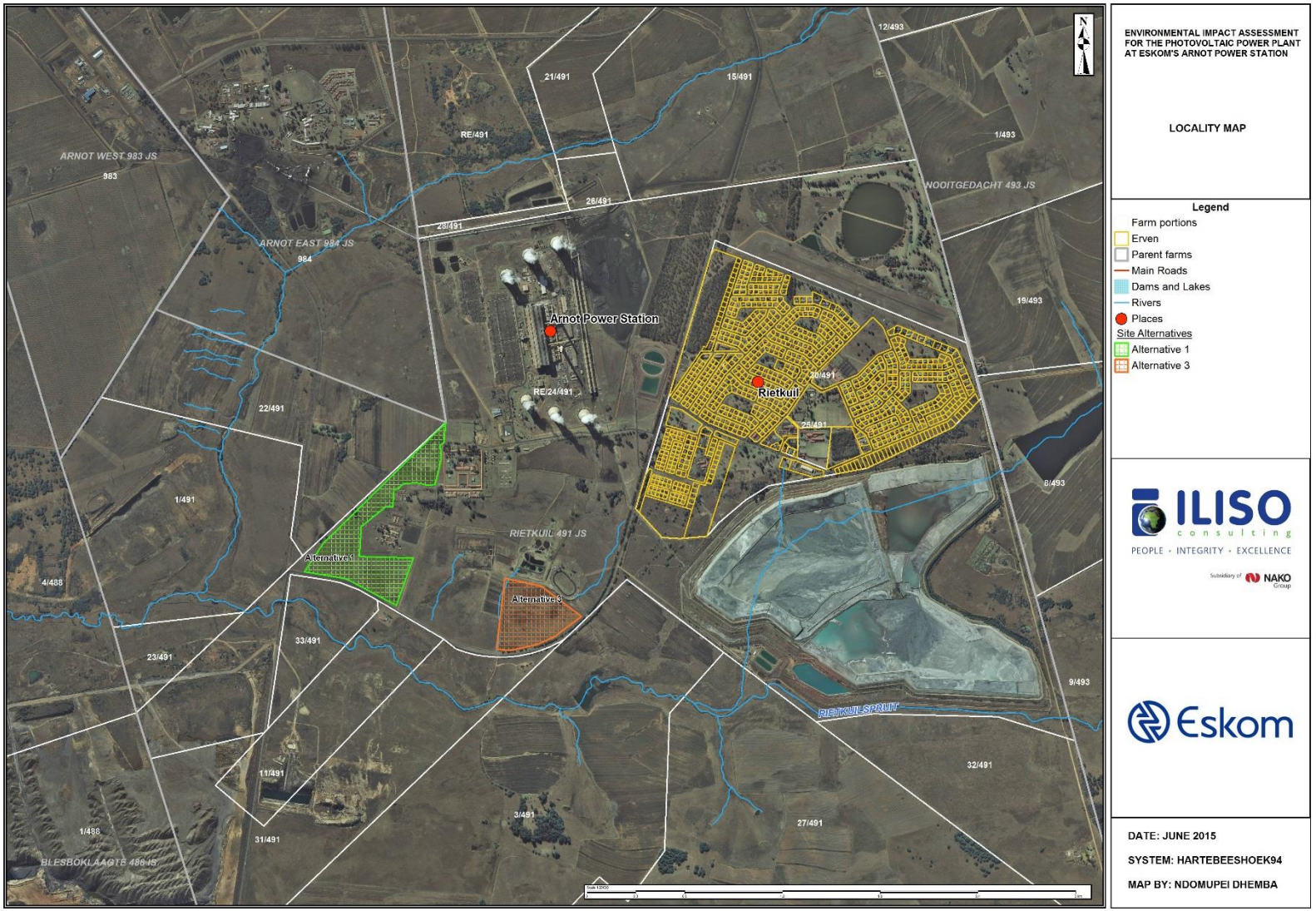


Figure 2: Aerial view of Arnot Power Station with areas of identified possible PV sites

Source: Arup, 2013

The below table provides a synopsis of the specialist site investigation regarding the sites.

Table 1-1: Site alternative details

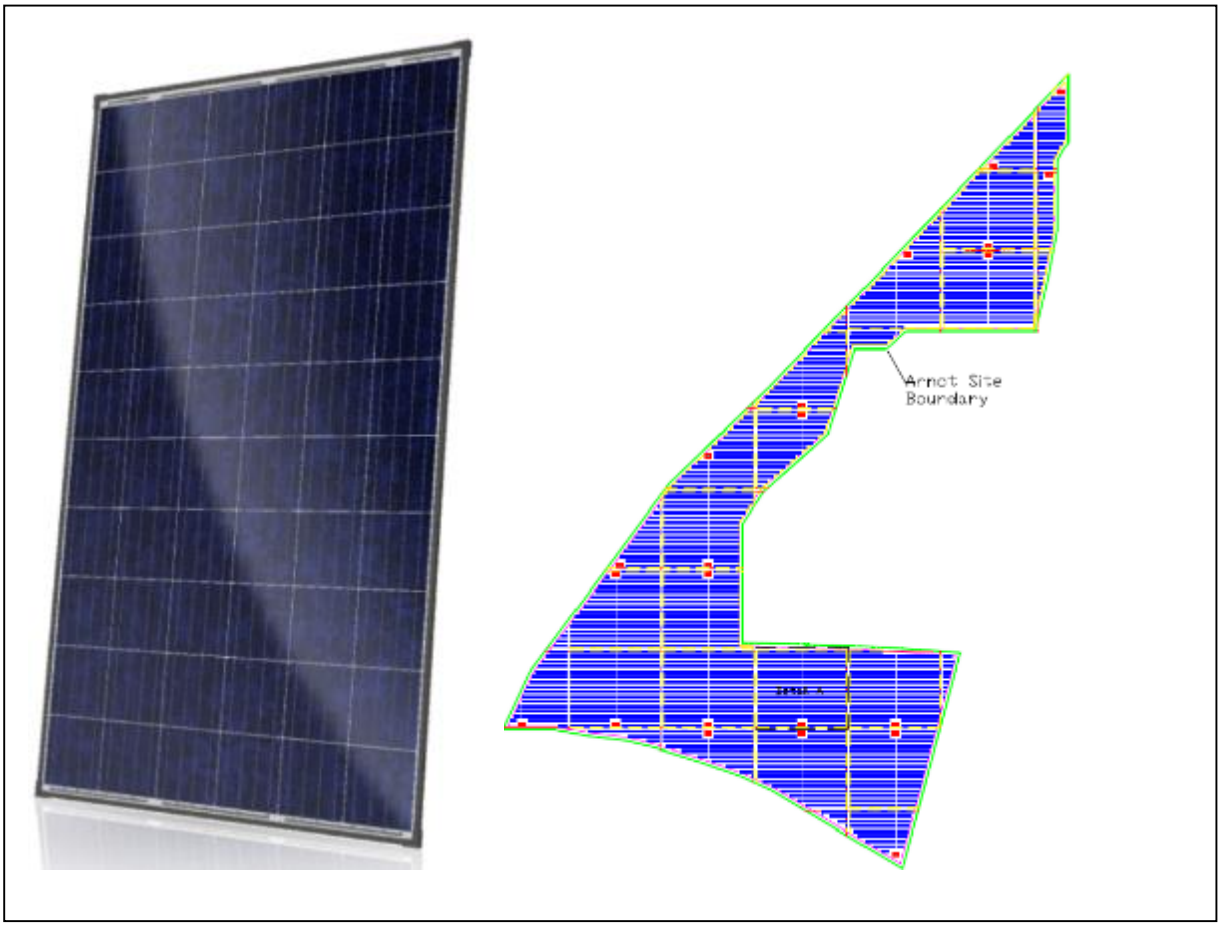
Site	Size (ha)	Estimated PV capacity (MWp)	Description
1	25.8	17.2	• Site is within Eskom owned land. • Flat land with little vegetation. • Power Station buildings adjacent to site area, possible shading from buildings
3	14.4	9.6	• Site is within Eskom owned land. • Flat land with little vegetation. • Long distance to point of connection into power station. • Near wetland area, could trigger environmental issues. • Smaller land area which will only trigger basic EIA.

Source: Arup, 2013

Arup (2013) also revealed that the preferred PV site falls part of the old construction yard which would not require rehabilitation if a PV facility could be built in and around the area.

A representation of what the solar PV panels will look like as well as the layout on the site is offered hereunder.

Figure 3: Diagrammatic representation of the solar panels and the PV layout



1.3 PROJECT BACKGROUND DESCRIPTION

Eskom Holdings SOC Limited is the South African utility that generates, transmits and distributes electricity. Eskom supplies about 95% of the country's electricity. Eskom has long recognised renewable energy as one of the sustainable options for generating clean (low carbon) electricity. Solar photovoltaic (PV) is considered as one such renewables option. Solar PV does not use water in electricity production, thus avoiding use of this scarce resource.

South Africa has a very high solar irradiance level, which makes PV a very attractive option regarding its introduction into the energy mix. PV, in many supply areas of South Africa, is already at grid under construction by Independent Power Producers (IPPs) under the Renewable Energy Independent Power Procurement Process (REIPPP). The REIPPP is a Government Procurement Programme that allows IPPs to build renewable energy facilities and export the energy back into the national grid through a competitive tariff bidding process. The REIPPP aims at installing and operating 3725 MW of renewable energy by the end of 2016 with the long term goal of constructing 17.8 GW of new renewable energy generation capacity by 2030.

In 2011/2012, Eskom successfully installed pilot Solar PV plants to supply Eskom's own-consumption, namely, a 620 kWp installation at the premises of Kendal power station, a 575 kWp installation with single-axis tracking at Lethabo power station, and finally a 358 kWp roof top installation and 400 kWp installation designed as parking canopies and a 24 kWp concentrating PV installation at Eskom's headquarters Megawatt Park to promote renewable energy awareness and to diversify its own energy mix.

Eskom is currently looking at further reducing their self-consumption at their various owned or utilised sites by introducing Eskom's Ilanga PV Project Portfolio which aims to install 150 MWp at their various power stations, offices and substations. The solar PV facilities will promote the reduction of Eskom's relative carbon footprint and support the demand side management energy efficiency programme.

The South African electricity system currently faces capacity constraints and needs to be addressed urgently. Eskom intends to roll-out these "own consumption" type of installations at existing Eskom-owned sites to an envisioned total capacity of between 400 to 600 MWp. The purpose of all these PV installations is to supply Eskom's own consumption and by doing so to diversify Eskom's energy mix, reduce Eskom's carbon footprint, and support the demand side management energy efficiency programme. This roll-out forms part of the Eskom Renewables Strategy in the Eskom Renewables Energy Unit. The proposed installation sites for this programme will comprise of Eskom owned properties around power stations. One of which, being proposed at the Duvha Power station.

1.4 REPORT STRUCTURE

This report discusses the findings of the social impact assessment and is organised according to the following sections:

- **Section 2:** Study approach, assumptions and limitations
- **Section 3:** Baseline description of social environment
- **Section 4:** Social impact assessment and management actions
- **Section 5:** Social management plan
- **Section 6:** Key findings and recommendations

2. STUDY APPROACH, ASSUMPTIONS & LIMITATIONS

2.1 INTRODUCTION TO SOCIAL IMPACT ASSESSMENTS

Social impacts are those impacts that affect the level of social and socio-economic activities in a region either positively or negatively. For instance, they directly affect the socio-economic well-being of residents in an area by changing employment levels, education and skills levels, household size and income levels. A socio-economic impact assessment traces demographic and livelihood developments in the local economy. It then measures the cumulative effects of those developments and patterns. The impact region is determined by the nature of the proposal and can include the entire country, province, an individual municipality or a combination of municipalities. In this case, the impact will mostly be projected for Steve Tshwete LM in Mpumalanga.

A social impact assessment (SIA) will evaluate the human behaviour within a particular social context and how this impacts on the project. The South African society is shaped by a variety of cultures, traditions, political and religious beliefs which creates a rather complicated context within which the economy must operate. The specific historical context of South Africa also develops the perceptions of people which are often formed based on preconceived ideas rather than accurate information.

Estimating the socio-economic impact of a project or development is very helpful in understanding the potential benefits of various forms of growth and changes made in the built environment.

Social impacts can be defined as "The consequences to human populations of any public or private actions (these include policies, programmes, plans and/or projects) that alter the ways in which people live, work, play, relate to one another, organise to meet their needs and generally live and cope as members of society. These impacts are felt at various levels, including individual level, family or household level, community, organisation or society level. Some social impacts are felt by the body as a physical reality, while other social impacts are perceptual or emotional" (Vanclay, 2002).

When considering social impacts it is important to recognise that social change is a natural and on-going process. However, it is also important to recognise and understand that policies, plans, programmes, and/or projects implemented by government departments and/or private institutions have the potential to influence and alter both the rate and direction of social change. Many social impacts are not in themselves "impacts" but change process that may lead to social impacts (Vanclay, 2002).

An SIA should therefore enable the authorities, project proponents, individuals, communities, and organisations to understand and be in a position to identify and anticipate the potential social consequences of the implementation of a proposed policy, programme, plan, or project. The SIA process should alert communities and individuals to the proposed project and possible social impacts, while at the same time allowing them to assess the implications and identify potential alternatives. The assessment process should also alert proponents and planners to the likelihood and nature of social impacts and enable them to anticipate and predict these impacts in advance so that the findings and recommendations of the assessment are incorporated into and inform the planning and decision-making process.

2.2 METHODOLOGY AND PROCESSES

The purpose of this section is to provide a short overview of the methodology applied and the processes followed.

The methodology for the social impact assessment entailed the following 4 steps:

Step 1: Inception and delineation of the study area: This step entailed consultation with the client regarding the particular requirements of the assignment, work processes and progress, and delineation of the study area.

Step 2: Social base profile: In order to determine the social impacts, a base profile of the study area was compiled by utilising relevant secondary data sources. Information was largely accessed from interrogation of maps, aerial photographs, technical discussions, existing secondary documents, and a site visit. Appropriate information was extracted from the relevant data sets to present information in terms of the social profile of the area. The desirability of the selected development in the context of the following documents was also evaluated:

- Mpumalanga Provincial Growth and Development Strategy (PGDS) (2004-2014)
- Mpumalanga Economic Growth and Development Path (MEGDP, 2011)
- Nkangala Local Economic Development Plan
- Nkangala Integrated Development Plan (2014/15)
- Nkangala Spatial Development Framework (SDF)
- Steve Tshwete Integrated Development Plan (2014/15)
- Steve Tshwete Draft SDF (2010)

Step 3: Social impact assessment: After a detailed analysis and understanding of the social fabric of the area, the identification of the possible social impacts followed. Emphasis was placed on identifying all positive and negative impacts on the immediately affected community, as well as other surrounding areas impacted upon. The identification of potential social issues associated with proposed facility is based on observations during the project site visit, review of relevant documentation, experience with similar projects and the general area.

Issues and concerns raised from all interested and affected parties involved in the public participation process, undertaken by ILISO Consulting (Pty) Ltd, was also taken into consideration.

Social impacts vary in both time and space. In terms of timing, all projects and policies go through a series of phases, usually starting with initial planning, followed by implementation (construction), operation, and finally closure (decommissioning). The activities, and hence the type and duration of the social impacts associated with each of these phases differ and the impacts have consequently been identified per phase.

The significance of impacts of the proposed development have been assessed by taking into account the extent, duration, intensity, frequency of the activity, frequency of the incident and the significance thereof (see below Table).

The nature of the impact is an evaluation of the type of effect the activity will have on the social environment of the area. The extent of the impact is provided to indicate whether the impact would be limited to the footprint of the development, local area and surroundings, regional impact or national impact. The duration of the impact indicates the lifetime of the impact in terms of immediate, short term (0-3 years), medium term (3-10 years), long term (more than 10 years) and permanent impact. The intensity of the impact includes reference to whether the impact is destructive or benign and is indicated as low (where society is not affected), medium (where the society is modified), and high (where the society is altered to the extent that it will temporarily or permanently cease). The frequency of action of the impact is described as negligible, improbable, probable, highly probable and definite. The frequency of incident of the impacts is determined through a synthesis of the aspects

produced, in terms of their nature, duration, intensity, extent and probability and is described as low, medium and high impacts.

Table 2-1: Impact Table

The maximum value that can be achieved is 100 Significance Points (SP). Environmental effects were rated as follows:

Significance	*Environmental Significance Points*	*Colour Code*
High (positive)	>60	H
Medium (positive)	30 to 60	M
Low (positive)	<30	L
Neutral	0	N
Low (negative)	>-30	L
Medium (negative)	-30 to -60	M
High (negative)	<-60	H

Status of Impact

+: Positive (A benefit to the receiving environment)

N: Neutral (No cost or benefit to the receiving environment)

-: Negative (A cost to the receiving environment)

Magnitude:=M	***Duration:=D***
10: Very high/don't know	5: Permanent
8: High	4: Long-term (ceases with the operational life)
6: Moderate	3: Medium-term (3-10 years)
4: Low	2: Short-term (0-3 years)
2: Minor	1: Immediate
0: Not applicable/none/negligible	0: Not applicable/none/negligible
Extent:=E	***Probability:=P***
5: International	5: Definite/don't know
4: National	4: Highly probable
3: Regional	3: Medium probability
2: Local	2: Low probability
1: Site only	1: Improbable
0: Not applicable/none/negligible	0: Not applicable/none/negligible

Step 4: Impact and management measures reporting/recommendations: This step entailed providing mitigations to minimise any negative social impacts of the envisaged development, as well as guidelines to maximise the positive social impacts. The management plan and mitigation options include identifying alternative ways of meeting needs, bringing about changes in plans, improving monitoring and management, improving negative perceptions, detailing on the role players and timing involved, etc.

2.3 ASSUMPTIONS AND LIMITATIONS

This SIA is based on the following assumptions and the following plant and associated infrastructure:

- It is assumed that the development sites represent technically suitable sites for the establishment of a solar energy facility.
- **PV Array**: The panels are mounted on metal structures which are fixed to the ground either through a concrete foundation or a deep seated screw. PV array represents the group of PV strings. A PV string is defined as group of PV modules connected together in series.
- **Wiring to Inverters**: PV Array is connected via Direct Current combiner boxes to the inverter. The inverter converts DC current to Alternate Current (AC) at grid frequency.
- **Transformer and interconnection**: The voltage is stepped up from the inverters output (which is Low Voltage roughly between 380V and 480V) to the voltage level required for the interconnection. It is anticipated that there will be several step-up transformers with approximate individual capacities of 1 to 2 MVA. These step-up transformers are generally located in close proximity to the inverters. The high voltage sides of these step-up transformers will be reticulated to a central point within the fenced PV site. One single line will then connect the PV site with the connection point of the power station (the low voltage side of the station transformer). This line will be buried underground minimise the impact footprint.
- **Civil works**: the main civil works are:
    - Terrain levelling – selection of flat surfaces to reduce amount of groundwork required.
    - Access and inside roads/paths – already existing paths to be used where possible, turning circle of trucks to be taken into consideration, use of roads /paths minimal when plant is in operation.
    - Trenching – all DC and AC wiring within the PV plant must be buried underground.
- **Balance of plant:** The balance of plant comprises of the following:
    - A control facility which monitors and controls the facilities operation and performance via fibre optic or similar cabling. The facility constitutes a brick or prefabricated building, with a footprint of no more than 100m^2, housing electrical switchgear and control equipment. The building will be provided with basic services such as water and lights.
    - Voltage and current regulators
    - Protection circuitry
    - Structures such as a control room and housing for transformers may also be required.
- **Construction**: period estimated at up to 12 months with an estimated 5,400 Mandays. The estimated construction cost is R306 Million Rand. Construction activities will include the following:
    - Sites preparation activities will include clearance of vegetation and the establishment of internal access roads within the PV facility's footprint. Clearing activities, where required, will involve the stripping of topsoil which will need to be stockpiled for reuse during rehabilitation of site.
    - Due to the modularity of PV and the associated effect that it is not anticipated that abnormal loads will need to be transported to the site, it is not likely that the external access roads (external access to the power stations as well as external to the PV facility sites) will need upgrading. However, the internal access roads within the PV facilities footprint will have to be dimensioned to carry the weight and be wide enough for a truck. The project will utilise portable sewage systems during construction. It is anticipated that all waste will be managed in line with each station's waste management procedures and processes.

- The contractors will be housed on the contractor's yard, required for stockpiling excavation material, storing of equipment and erection of the temporary site office, which shall be situated within the proposed footprint of the site. The exact location is not yet determined and will be defined by the Contractor, upon the award of contract.
- **Operation:** The Facility is designed to operate continuously, unattended and with low maintenance for approximately 25 years. Operating procedures include cleaning PV modules, routine and corrective maintenance on electrical infrastructure and mechanical vegetation control procedures. The permanent internal access roads for access to the PV plant will have to be dimensioned such to carry a standard 4x4 vehicle. During operation time the number of people employed will drop drastically (no permanent employees at site for specific operation activities, but permanent security guards may be employed to manage access to site).
- The PV plant will consist of following:
    - PV Modules
    - Mounting structures to hold PV modules
    - Electrical cablings to connect PV module to inverter
    - Inverter and inverter cabins
    - Pant substation
    - Transformers
    - Transmission lines
    - Fences
- Plant layout and components include:
    - PV plant dimension: 25.8 ha
    - No. of Solar Panels: Approximately 68 ,800 (c-si technology) and 172 000 (thin film technology)
    - Inverter Cabins: 17
    - Transmission line: Approximate length 2000 m – 3000 m
    - Fences: A 3600 m fence around the periphery of site, up to 3 m height
- Infrastructure required: storm water infrastructure (drainage channels, berms, detention ponds); buildings (connection building, control building, guard cabin, solar resource measuring substation); Access road etc. The following infrastructure will be required:
    - Drainage channel for rain water collection, if required.
    - Control and O&M building
    - Plant substation
    - Meteorological station
    - Access road (existing access roads will be used)
    - Internal road

The following constraints and limitations were encountered during the study:

- Assessments of impact significance for social impact often need to be made without quantification. These are based on a consideration of the likely magnitudes of impacts and/or expert judgements, unless otherwise specified or quantified.
- The assessment only considers the impacts of the proposed project and the no-go and does not make comparisons with other solar energy projects. Note that the development is on Eskom owned land and that there is thus no scope for aspirant competing solar energy project developments.
- Details pertaining to residents and hostels complexes on Eskom owned land were not available at the time of writing.

3. BASELINE DESCRIPTION OF SOCIAL ENVIRONMENT

This section provides a strategic understanding of the social profile of the study area and its surroundings. The main objective of this section is to develop a better understanding of the social performance of the area as a background to the development of the project. The data presented in this section has been largely derived from the Mpumalanga Provincial Growth and Development Strategy (PGDS) (2004-2014), Mpumalanga Economic Growth and Development Path (MEGDP, 2011), Nkangala Local Economic Development Plan, Nkangala Integrated Development Plan (2014/15), Steve Tshwete Integrated Development Plan (2014/15), Steve Tshwete Spatial Development Framework (2010), as well as from the most recent (2011) Census and Quantec statistics.

In order to assist in determining the social impact of the proposed Solar PV plant at Arnot Power station, this section provides a delineation of the study area, a brief social status quo, a general description of the study area and its immediate surroundings, and a brief policy overview.

The social status quo provides information pertaining to: demographics, employment and labour profile, household profile and income levels, and contribution to Gross Domestic Product per Region (G-DPR).

3.1 DELINEATION OF STUDY AREA

This development is proposed to be situated within the jurisdiction of the Steve Tshwete Local Municipality, within Eskom owned property. However, the impact of the project will not be limited to the study application area.

There is only one settlement, namely Rietkul, situated within the Rietkul sub-place that is located within the direct zone of influence within a 5km radius from the identified sites. The nearest towns to the proposed sites are Belfast and Middleburg. The sites and the Arnot Powerstation are located within the Rietkuil mine sub-place.

It is anticipated that some of the labour, goods, and services required for the construction phase could come from the Rietkuil settlement, Hendrina, Middelburg, and Steve Tswhete LM. However, this depends on the contractor appointed. Most of the required goods and services needed in construction will be sourced from the rest of the Mpumalanga Province, the Gauteng Province, South Africa and possibly other countries.

Census 2011 data are the most recent official available data at small-area level and the social baseline profile provided in this section is based on data obtained by Stats SA Census 2011 and Quantec as well as data obtained from interrogation of all maps and aerial photographs, technical discussions, and existing data from secondary documents.

3.2 SOCIAL STATUS QUO

This section provides both qualitative and quantitative data related to the regions under observation, creating a baseline against which the impacts can be assessed.

The following socio-economic indicators are analysed:

- Demographic profile
- The economy and its structure

- The labour force and employment structure
- Status of infrastructure

3.2.1 DEMOGRAPHIC PROFILE

Understanding the population of any geographical area helps to analyse different developmental trends. Population figures and population growth rate assist in determining the demand for production output and the potential growth thereof. By analysing the population and population trends in an area, one can begin to understand how any proposed project may affect the people living around the area where the proposed project is planned to be established. The following sub-section describes the status-quo of the primary and secondary study areas for the proposed PV power plant.

Key demographics indicators are presented in the table below.

Table 3-1: Key demographic indicators, 2011

GEOGRAPHY	DEMOGRAPHIC INDICATORS				
	Area (in km²)	Total population	Total households	Household s size	Population density (people per km²)
South Africa	1 220 813	51 770 560	14 450 161	3.58	42
Mpumalanga	76 495	4 039 939	1 075 488	3.76	53
Nkangala District	16 758	1 308 129	356 911	3.67	78
Steve Tshwete LM	3 997	229 831	64 971	3.54	58
Rietkuil mine SP	4	637	180	3.54	151
Rietkuil SP	44	2 998	927	3.23	69

Source :Stats SA, Census 2011

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

At 3 997 km², the Steve Tshwete LM is the largest Local Municipality in the Nkangala DM. The municipality had a population of 229 831 people in 2011, accounting for approximately 18% of the district's population.

The Municipality is comprised of two primary nodal points namely: Middelburg/Mhluzi that is the main commercial and administrative centre, and the much smaller Hendrina / Kwazamokuhle near the south/east boundary. Other than Middelburg and Hendrina, the remainder of the municipal area consists of the following settlements:

- **Agricultural service centres:**
- Somaphepha (Kwa-Makalane)
- Sikhululiwe (Mafube)
- Doornkop needs
- **Holiday towns:**
- Presidentsrus
- Kranspoort

- **Towns associated with power stations:**
- Rietkuil,
- Pullenshope
- Komati
- **Villages associated with mines:**
- Blinkpan/Koornfontein,
- Naledi
- Lesedi
- **Villages associated with Kanhym farming company:**
- Thokoza
- Eikeboom

Land between the above indicated villages and settlements consists mostly of private agricultural properties where mainly maize is cultivated.

There are 64 971 households in the Steve Tshwete LM, which equates to approximately 18% of the district's number of households. The Steve Tshwete LM is predominantly an urban municipality where approximately 90% of the population is located in urban settlements. The urbanised structure of the population is indicative of the labour concentrated around intense mining and manufacturing industries or other sources of employment.

The Rietkuil Mine sub-place had approximately 180 households in 2011 with an average household size of 3.5 persons. This is the area in which Arnot Power station is located.

The Rietkuil settlement had approximately 927 households in 2011 (and currently an estimated 1100 households) with an average household size of 3.5 persons. This settlement is the closest to the proposed PV power plant. Rietkuil is situated approximately 35 km east south east of Middelburg, being the third largest settlement in the Steve Tshwete Local Municipality. Activities in Rietkuil are limited to a neighbourhood centre that provides in the day to day needs of the community.

The Compounded Annual Growth Rate (CAGR) of Steve Tshwete LMs population between 1996 and 2011 was 1.7%. It was higher than the CAGR of the provincial and national population during the same period. Over the years, the national and provincial population growth rates have been slowing down. This trend however is not only national and provincial phenomena, but a global phenomenon. While some of the countries in the world, most of which are less developed countries, still experience relatively high population growth rates, the overall global trend is that the annual population increase is slowing down. The reasons behind these trends are numerous and could relate to family planning programmes undertaken by countries, economic situation, increasing death rates due to aging population, better education, etc. In South Africa, the reasons behind its population growth deceleration are routed to (a) the HIV/AIDS pandemic and related diseases, (b) declining fertility rates, particularly in urban areas which population continues to grow, and (c) improving education levels particularly among girls. Importantly, however, Steve Tshwete population growth has been constantly increasing over the years reaching about 2% per annum over the past five years. This could be attributed to the increasing net migration numbers in the area, which in turn could be related to a relatively good standard of living in that Municipality and greater opportunity to find employment compared to the other places in the Province.

The age composition or structure determines the kind of activities within the area. See below table.

According to the Census 2011, Steve Tshwete LM has a large youthful population between the age group of 0-14 constituting 25% of the entire population. The working age between 15-64 age groups

constitutes 71% of the total population and the elderly (over 65) accounts for 4% of the population. In terms of gender differentiation there is a slight imbalance between male and females. The Census 2011 revealed that approximately 52% of the population are males with 48% being females. A higher proportion of males are found in the urban areas in search of work opportunities. This trend can often be observed in mining towns where the mining industry is predominantly male orientated.

Table 3-2: Distribution of population by age and gender, Steve Tshwete LM, 2011

AGE	Male	Female	Total
0-14 years	13%	13%	25%
15-64 years	38%	33%	71%
65+ years	2%	2%	4%
Total	52%	48%	100%

Source: Kayamandi calculations from Stats SA, Census 2011

With regards to energy usage, the share of energy use for households from Steve Tshwete in 2011, was as follows:

- **Lighting:**
  - Electricity: 90.8%
  - Candles: 7.8%
  - Paraffin: 0.6%
  - Gas: 0.6%
  - Solar: 0.2%
  - None: 0.3%
  - **Total: 100%**
- **Heating:**
  - Electricity: 63%
  - Coal: 14.5%
  - None: 13%
  - Wood: 4.8%
  - Gas: 2.7%
  - Paraffin: 1.6%
  - Solar: 0.2%
  - Animal dung: 0.1%
  - **Total: 100%**
- **Cooking:**
  - Electricity: 81.7%
  - Coal: 7%
  - Paraffin: 5%
  - Wood: 3.6%
  - Gas: 2%
  - None: 0.3%
  - Solar: 0.2%
  - Other: 0.1%
  - **Total: 100%**

There is heavy reliance on electricity, coal, candles, wood, and paraffin as sources of energy with electricity as the most popular source of energy. There is limited use of solar power.

3.2.2. EMPLOYMENT AND LABOUR CLASSIFICATION

Employment opportunities allow people to earn an income, which enables them to provide for their basic needs and contribute to improving their standards of living. Thus, employment and unemployment rates are important means to determine socio-economic well-being of an area.

Table 3 below table shows labour force indicators.

As with the rest of the country, unemployment is a major challenge in the area. “Jobless” growth remains a feature of the economy and it is likely that the relatively weak economy will result in further pressure on employment.

In 2011, almost 34 million people were within the working age in South Africa. Of these, 13.2 million were non-economically active and 18.7 million formed the labour force. Concurrently, the labour force participation rate was 55% meaning that in 2011 just over half of the working population in South Africa was either employed or unemployed. The number of employed people in South Africa amounted to just above 13 million people, leaving approximately 5.6 million people or 30% of the labour force unemployed.

Table 3-3: Key labour force indicators, 2011

GEOGRAPHY	LABOUR FORCE INDICATORS						
	Working age population	Non-economically active	Labour force	Employed	Unemployed	Unemployment rate	Labour participation rate
South Africa	33 904 481	13 295 256	18 774 133	13 180 078	5 594 055	30%	55%
Mpumalanga	2 589 547	1 020 806	1 417 897	969 771	448 126	32%	55%
Nkangala District	869 923	319 641	507 728	355 478	152 250	30%	58%
Steve Tshwete LM	162 413	50 252	107 069	85 968	21 101	20%	66%
Rietkuil Mine SP	539	230	290	248	42	14%	54%
Rietkuil SP	2 264	676	1 515	1 374	141	9%	67%

Source: Kayamandi calculations from Stats SA, Census 2011

In comparison, the local municipality of Steve Tshwete consisted of 162 413 people within a working age in 2011. This accounts for 70% of the total population, from which approximately 85 968 were employed. Compared to South Africa's labour participation rate of over 55%, the Steve Tshwete LM labour participation rate was higher and equal to 66%. Essentially, just under one third of the working age population in the Steve Tshwete LM was non-economically active, a significant portion of whom were discouraged job seekers (24%). Of the economically active population (107 069), 20% were unemployed, which means that the unemployment rate in the municipality was lower than in the rest of the country. Considering that the labour force participation rate in the LM was greater than in South Africa, the lower unemployment rate indicates that the population of the LM could be experiencing better socio-economic conditions compared to the rest of the country. This could also be as a result of labour in-migration in search of work in Steve Tshwete LM.

In the Rietkuil settlement, the labour force was approximately 1500 workers in 2011 of which only 9% were unemployed.

The employment structure of the economy provides valuable insight into the dependency of an area's income and employment on specific sectors. Knowledge of the structure and the size of each sector relative to employment participation of the labour force in the study area are important when assessing potential social impacts. This allows the assessment of the extent to which the proposed activity would change the structure of the economy and trends of specific sectors relative to employment.

The sectoral share of formal employment is shown in Table 4 below.

It is evident from the below Table that the primary sector, more specifically the mining industry, creates nearly a third of the employment opportunities in the Steve Tshwete LM compared to the tertiary sector. The latter is the main employment sector nationally creating about two out of three employment opportunities in the country. In Steve Tshwete LM, the mining sector is followed by the government and community services sector that contributes to 21% of formal local employment. Wholesale, retail and trade follows with 14% of local employment. The manufacturing, business

services and agriculture sector each employs approximately 10% of the formal employees. Electricity generation creates approximately 4% of employment positions in the Steve Tshwete LM.

Table 3-4: Sectoral share of formal employment, 2013

SECTOR		South Africa	Mpumalanga	Nkangala DM	Steve Tshwete LM
Primary sector	Agriculture, forestry & fishing	7%	12%	7%	10%
	Mining & quarrying	5%	13%	20%	22%
Secondary sector	Manufacturing	11%	8%	9%	11%
	Electricity, gas & water	1%	2%	3%	4%
	Construction	4%	4%	4%	5%
Tertiary sector	Wholesale and retail trade	16%	15%	12%	14%
	Transport & communication	4%	2%	3%	3%
	Finance & business services	18%	13%	13%	11%
	Government and community	35%	31%	30%	21%
TOTAL		**100%**	**100%**	**100%**	**100%**

Source: Kayamandi calculations from Quantec, 2015

The following table identifies at what skill level people are formally employed.

The figures provided for Steve Tshwete LM are almost on par with the other regions depicted. In 2013, however, only 15% of the formally employed population were highly skilled. The majority of the formal workers (47%) in Steve Tshwete in 2013 work in semi and unskilled jobs.

Table 3-5: Distribution of formal employment by skill level, 2013

INCOME GROUPS	South Africa	Mpumalanga	Nkangala DM	Steve Tshwete LM
Highly skilled	18%	16%	17%	15%
Skilled	42%	39%	39%	38%
Semi- & unskilled	40%	45%	44%	47%
Total	100%	100%	100%	100%

Source: Kayamandi calculations from Stats SA, Census 2011 and Quantec standardized regional data, 2015

Approximately 31% of employment in Steve Tshwete LM is in the informal economy. Informal trading activities allow for job creation and help to absorb the population in need of an income but who would otherwise be economically idle.

Annual household income can serve as an indicator for the income distribution of households located within the broader area. Income distribution is one of the most important indicators of social welfare, as income is a primary means by which people are able to satisfy their basic needs such as food, clothing, shelter, health, services, etc. Changes in income inflict changes in the standard of living, more specifically: a positive change in income can assist individuals, households, communities and countries to improve living standards. There is a direct linkage between household expenditure and economic growth. Increase in household expenditure means a greater demand for goods and services, which means an increase in production and positive change in the size of an economy.

A robust increase in disposable income, as seen in South Africa 2005/6 coupled with low interest rates in the country stimulated an increase in consumption by households, in particular durable and semi-durable goods, which in turn had a positive impact on the country's economy. Knowledge of the volume of the disposable income and the expenditure patterns of households, therefore, can provide vital intelligence with respect to the sectors that are most dependent on the household income and therefore would be most affected in the case of the change in household income.

Table 3-6: Distribution of annual household income, 2011

INCOME GROUPS	South Africa	Mpumalanga	Nkangala DM	Steve Tshwete LM	Rietkuil SP
No income	15%	14%	14%	13%	6%
R 1-R 4 800	4%	5%	4%	3%	2%
R 4 801-R 9 600	7%	9%	7%	4%	4%
R 9 601-R 19 200	17%	19%	16%	11%	8%
R 19 201-R 38 400	19%	20%	19%	16%	7%
R 38 401-R 76 800	13%	13%	16%	17%	15%
R 76 801-R 153 600	9%	9%	11%	14%	21%
R 153 601-R 307 200	7%	6%	7%	11%	25%
R 307 201-R 614 400	5%	3%	4%	7%	10%
R 614 401-R 1 228 800	2%	1%	1%	2%	2%
R 1 228 801-R 2 457 600	1%	0%	0%	1%	1%
R 2 457 601 or more	0%	0%	0%	0%	1%
Total Households	**100%**	**100%**	**100%**	**100%**	**100%**

Source: Quantec standardized regional data, 2011, Stats SA Census 2011 and Kayamandi calculations

As is evident from the above table, approximately 13% of the households in Steve Tshwete LM earn no income, while approximately only 6% of households in Rietkuil Settlement (Rietkuil SP) earn no income. Half of the households in Steve Tshwete LM earn less than R38,400 per annum, while for the District, Province and country these represent 60%, 67%, and 63% respectively. These low income levels are largely a reflection of unemployment levels reported on above. Based on the above figures, it can be concluded that the household income situation in Steve Tshwete was healthier than in the country or in the Province. A lower percentage of low-income earning households in the primary study area means that proportionally Steve Tshwete had a greater number of households earning more than R3 200 per month in 2011 than other areas. This had a positive impact on the weighted average household income in the Local Municipality compared to that of the country or the Province.

Education plays a pivotal role in community development. It provides a set of basic skills for development, creativity and innovative abilities. The South African Constitution stipulates that everyone has a right to education. Education has a large influence on employment and income level, as it enables people through training to be more productive in the various sectors of the economy.

The following table provides an indication of the level of education as recorded in 2011.

The below data reveals that approximately 38% of the population aged 20 years and older that reside within Steve Tshwete LM have a matric qualification or higher. This is slightly higher than the average for the District, Province and the rest of the country. In addition to this, only 7% of the population aged 20 years and older in Steve Tshwete LM have no schooling, compared to 9% of the District, and 10% of the Province.

Table 3-7: Level of education of population aged 20 years and older, 2011

GEOGRAPHY	LEVEL OF EDUCATION						TOTAL
	No schooling	Some primary	Complete primary	Some secondary	Grade 12/std 10	Higher	
South Africa	7%	26%	5%	32%	21%	8%	100%
Mpumalanga	10%	27%	5%	31%	20%	6%	100%
Nkangala District	9%	25%	5%	32%	22%	7%	100%
Steve Tshwete LM	7%	21%	4%	30%	27%	11%	100%
Rietkuil SP	9%	15%	3%	28%	29%	15%	100%

Source :Stats SA, Census 2011

Education is an important factor to consider in a regional socio-economic analysis as it plays a crucial role in the potential rate for development, income levels of the community and the ability to begin to build a sustainable path out of poverty. Education and housing are considered to be obvious associations with asset accumulation as they equip households with vital resources to move out of chronic poverty. Employment opportunities are also necessary for a sustained development growth path for households. The next section deals with employment statistics and labour classification.

3.2.3 CONTRIBUTION TO GROSS DOMESTIC PRODUCT PER REGION

Interpretation of economic impacts requires a sound understanding of the size of the economy and its dynamics in the past. A number of indicators exist that can describe the economy of a region or an area. The most common variables that are used for the analysis include production and Gross Domestic Product per Region (GDP-R). Production represents the total value of sales of goods and services, or the turnover of all economic agents in a region; whilst GDP-R, using the output approach, means the sum of value added created by all residents within a certain period of time, which is usually a year. The trend at which the GDP-R has been changing in the past is also referred to the economic growth indicator. It is a measure of both the performance of an area and the well-being of the citizens of an area. Faster economic growth than population growth is taken as an indicator of a healthy economy and an improvement in citizens' well-being.

Employment, labour and Gross Domestic Product per Region (GDP-R) statistics provided in this section can be divided into three main sectors, namely the primary, secondary and tertiary sectors. Each of these main sectors is further subdivided into the following economic sectors to which reference is made throughout the remainder of this report:

- **Primary sector**
  - Agriculture/hunting/forestry/fishing – establishments primarily engaged in farming activities or the rendering of agricultural services. Also included are commercial hunting, game farming, forestry, logging and fishing
  - Mining/quarrying – the extracting, dressing and beneficiation of minerals occurring naturally
- **Secondary sector**
  - Manufacturing – the physical or chemical transformation or assembly of materials or compounds into new products
  - Electricity/gas/water – production, collection and distribution of electricity, the manufacture and distribution of gas, the collection, purification and distribution of water

- Construction – site preparation, demolition, building of constructions/buildings, civil engineering, installation, plumbing, decorating, etc.

- **Tertiary sector**
  - Trade/catering – the wholesale or retail resale of new and used goods in stores, stalls, markets, by mail-order or by other means as well as hotels, restaurants, bars and other tourist activities
  - Transport/communication – the providing of passenger or freight transport by rail, road, water or air. Includes cargo handling and storage, postal activities, courier activities and the transmission of sound, images, data or other information
  - Business and financial services – the activity of obtaining and redistributing funds, financial intermediation, insurance and pension funding. The buying, selling, renting and operating of owned or leased real estate
  - Government and community services – activities of central, provincial and local government. Provision of community services, e.g. education, health services, social work, and activities of professional organisations

The following table provides the GDP-R figures per year per area between 2003 and 2013.

As is evident from the below table, the GDP-R contribution for Steve Tshwete Local Municipality between 2003 and 2013 increased from R7 billion to R20 billion.

Table 3-8: GDP-R (R billions) at current prices (2014 release), 2003-2013

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
South Africa	1155	1270	1401	1572	1792	2028	2180	2423	2635	2820	3030
Mpumalanga	78	85	93	105	119	143	155	172	189	205	213
Nkangala District	30	34	37	43	49	60	66	73	81	89	90
eMahlaleni LM	7	8	9	10	11	14	15	16	18	19	20

Source: Quantec standardized regional data, 2011, Stats SA Census 2001 and Kayamandi calculations

The table below shows the average annual growth rates per region between 2003 and 2013. It can be highlighted that Steve Tshwete LM is experiencing a slightly lower growth rate than the other regions, with 1.9% average growth per annum while the Province and South Africa are experiencing 2.8%; and 3.4% average annual growth respectively.

Table 3-9: Average annual GDP-R growth at constant (2005 prices), 2003-2013

GEOGRAPHY	Average annual growth rate (2003-2013)
South Africa	3.4%
Mpumalanga	2.8%
Nkangala District	2.6%
Steve Tshwete LM	1.9%

Source: Quantec standardized regional data, 2011 and Kayamandi calculations.

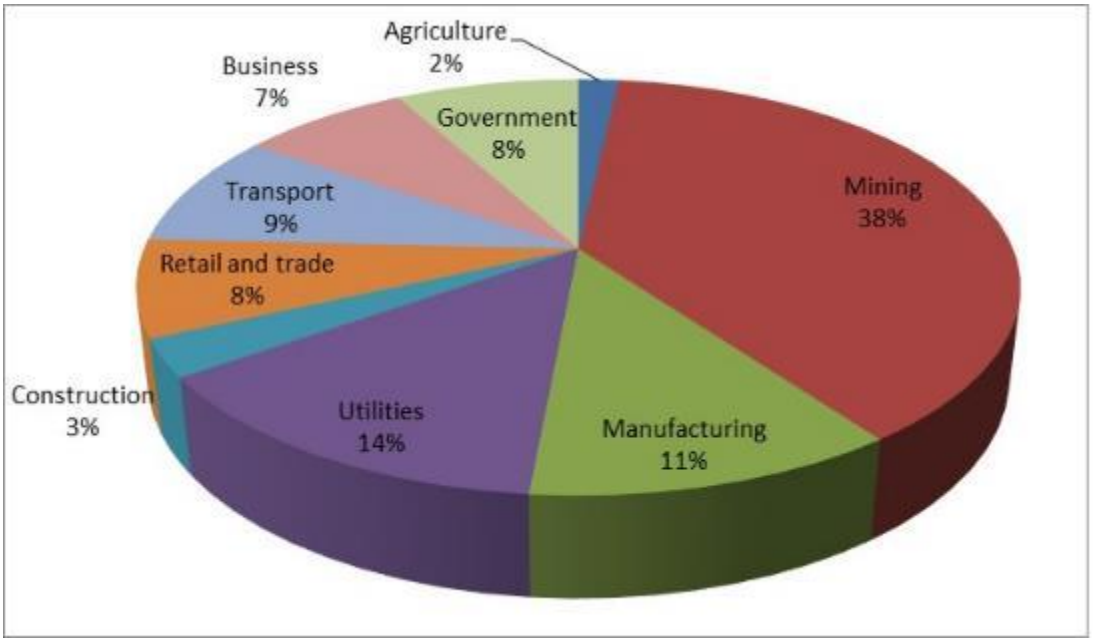
The below table provides and an indication of the sectoral distribution of GDP-R and the below figure indicates the GDP-R distribution per sector for Steve Tshwete LM.

Table 3-10: Percentage GDP-R distribution by sector at current prices, 2013

SECTOR		South Africa	Mpumalanga	Nkangala DM	Steve Tshwete LM
Primary sector	Agriculture	2%	3%	1%	2%
	Mining	9%	30%	40%	38%
Secondary sector	Manufacturing	12%	11%	10%	12%
	Utilities	3%	7%	9%	14%
	Construction	4%	2%	3%	3%
Tertiary sector	Trade	17%	12%	8%	8%
	Transport	9%	8%	9%	9%
	Finance	22%	11%	9%	7%
	Government and community services	23%	16%	12%	8%
Total		**100%**	**100%**	**100%**	**100%**

Source: Quantec standardized regional data, 2011, Stats SA Census 2001 and Kayamandi calculations

Figure 4: Sectoral GDP-R distribution at current prices for Steve Tshwete LM, 2013



Source: Quantec standardized regional data, 2015, and Kayamandi calculations

The above table and figure shows that in Steve Tshwete, the Nkangala District and the Mpumalanga Province, mining and manufacturing have the strongest GDP-R percentages. The government services sector in Steve Tshwete LM is particularly lower than in the other regions. This highlights that the local economy is fairly strong as government services play a smaller role in sustaining the economy through job creation in the public sector. The weakest sector in Steve Tshwete LM is the agriculture sector.

3.3 GENERAL DESCRIPTION OF LOCAL STUDY AREA AND IMMEDIATE SURROUNDINGS

The proposed PV Solar plant will be located in the Steve Tshwete Local Municipality which is located within the administrative boundaries of Nkangala District Municipality which forms part of the Mpumalanga Province.

The majority of the Steve Tshwete LM population lives in urban areas with an increasing number of people moving from rural areas to the urban areas of the municipality.

The below figure shows the land cover for Steve Tshwete Local Municipality.

There is only one settlement that is located within the direct zone of influence within a 5km radius from the identified sites. This is the rural settlement of Rietkuil located within the Rietkuil SP.

According to the Steve Tshwete Spatial Development Framework "In 1965/66 contractors started with roads, pipelines and ground works on the farm Rietkuil, which Eskom bought from seven owners. Sufficient water and especially coal supply in the Rietkuil area ensured that the construction of Arnot power Station commenced in 1968. Arnot was Eskom's first modern coal-fired power station and was fully operational by June 1975. Three of its units were put into reserve storage (mothballed) in 1992 due to the surplus generating capacity Eskom had at the time. The units were recommissioned in January 1997, November 1997 and December 1998 respectively. The station is 31 years old. The Rietkuil Village is a formal proclaimed Eskom Village which served as residential area for workers at the power station. The village also boasts various community facilities".

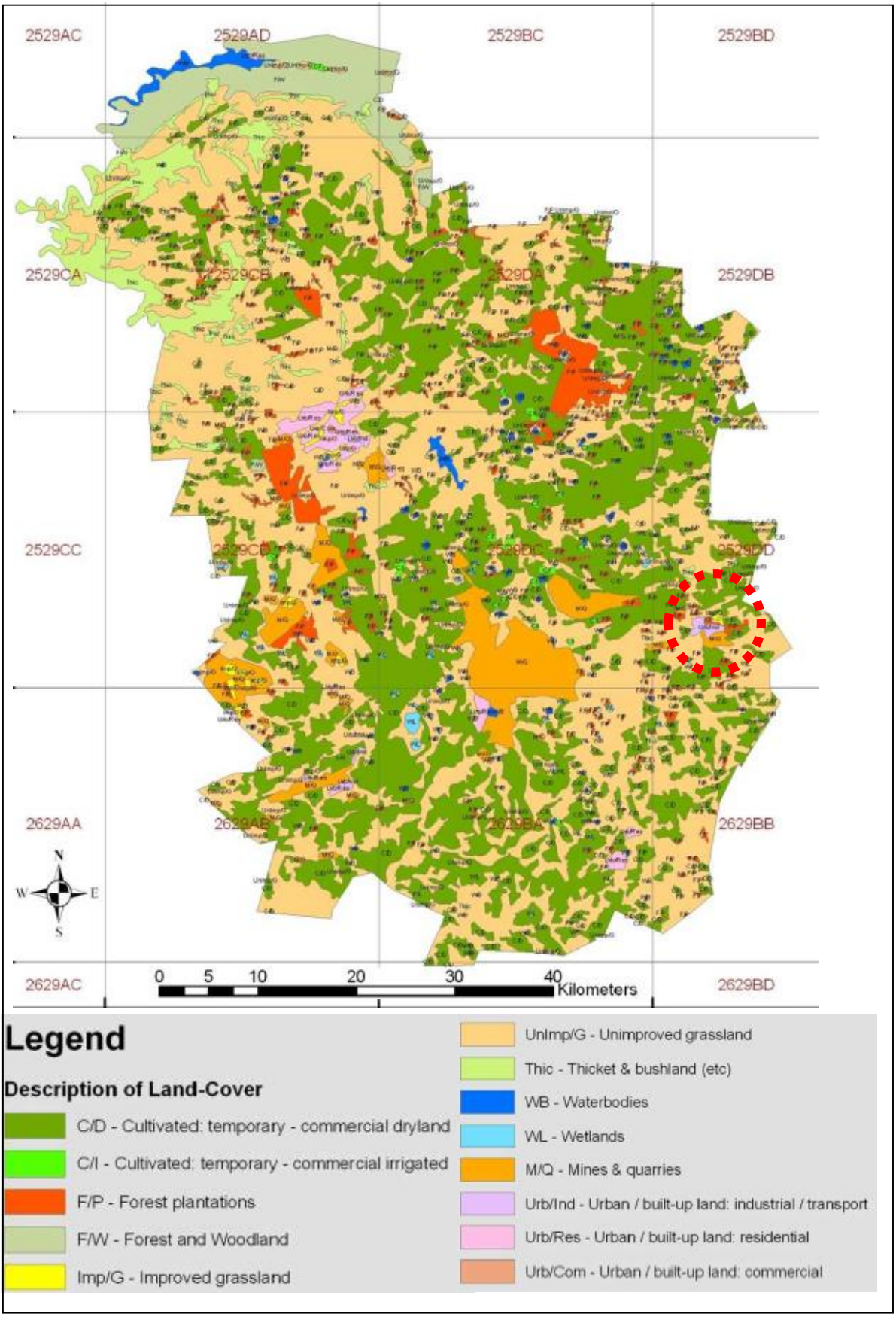
The Rietkuil settlement had approximately 927 households in 2011 (and currently an estimated 1100 households) with an average household size of 3.5 persons. This settlement is the closest to the proposed PV power plant and will most likely be the area from which construction workers could be sourced. Rietkuil is situated approximately 35 km east south east of Middelburg, being the third largest settlement in the Steve Tshwete Local Municipality. Activities in Rietkuil are limited to a neighbourhood centre that provides in the day to day needs of the community.

As can be noted from the land cover, surrounding the study area is coal mining industry, which operates mainly in the southern part of the municipality, south of the N4 national road. Conflictingly the southern area is also the area in which the highest agricultural potential is found, comprising of arable land under irrigation, mostly comprised of maize farming.

There are no tourism sensitive land uses and land cover that will be directly impacted by the construction and operation of the proposed plant.

The figures following on after land cover, show the Arnot power station in relation to nearby Rietkuil as well as the proposed sites.

Figure 5: Land cover for Steve Tshwete LM

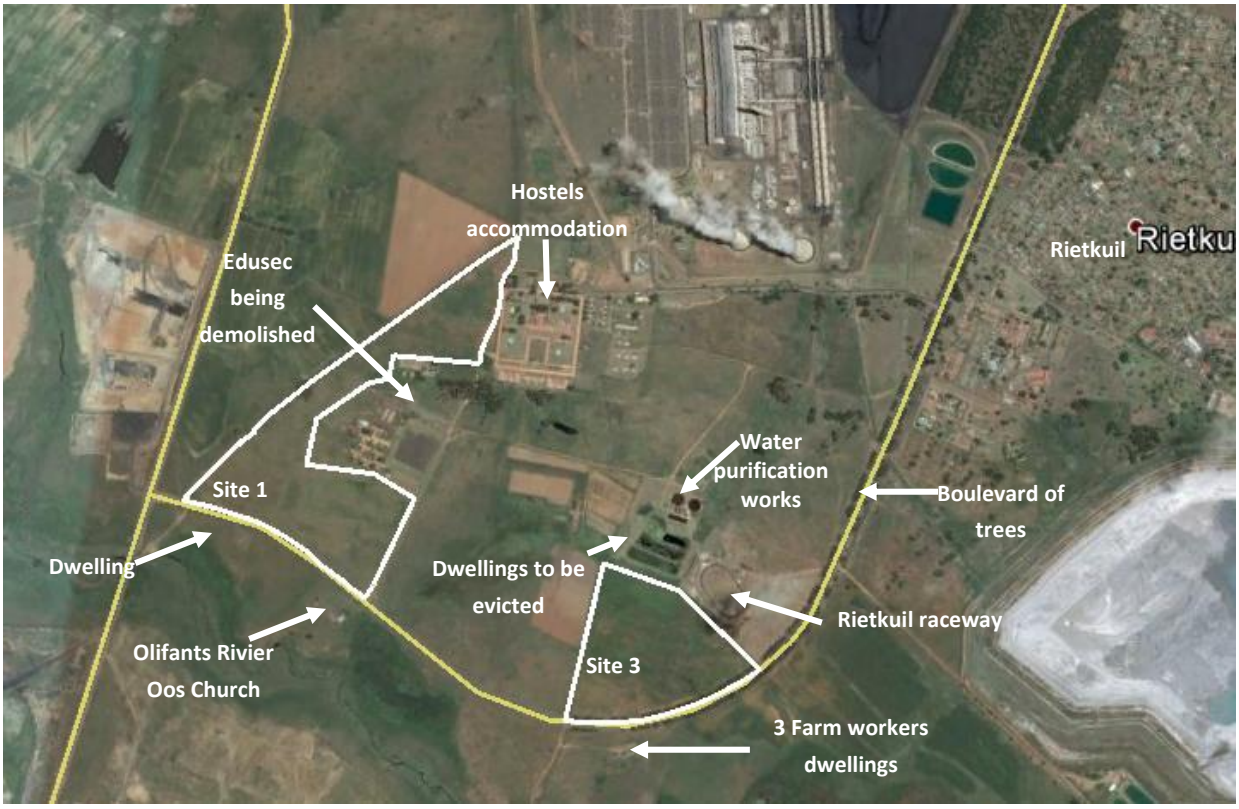


Source: Steve Tshwete SDF (2010)

Figure 6: Arnot Power station in relation to Rietkuil

Source: www.google.co.za

Figure 7: Aerial view of Arnot Power Station, proposed sites and immediate surrounds



The land area around Arnot power station is mainly flat with vegetation and several trees in the area. Both sites are situated within Eskom owned property and both are directly adjacent to non-Eskom owned property.

Site 3 is screened from the main road leading to Rietkuil from an avenue of trees. To the south of site 3 is adjacent agricultural farm land and directly across the road from site 3 are 3 farm workers dwelling

units. To the direct north of Site 3 are some houses and the water purification works. The occupants of these houses will according to Eskom be evicted. There is also a sewerage plant to the north of site 3. To the north east of site 3 is the Rietkuil raceway race track which is on Eskom owned property. The raceway track is operational once a month only where championship events are held. To the East of Arnot power station is the Rietkuil settlement. Site 3 is screened somewhat by an avenue of trees along the main road.

Directly adjacent to Site 1, within the centre portion next to the site which is not proposed for the PV plant is the Fermi Building (Edusec) which is currently being demolished. To the east of the northern half of site 1 are numerous hostel blocks, and site workers accommodation. To the south of site 1 is a dwelling as well as a Hall and the 'Geloftefees' terrain of the 'Olifants Rivier Oos' church community. See below photographs.

Figure 8: Photographs of Arnot Power Station, proposed sites and surrounds

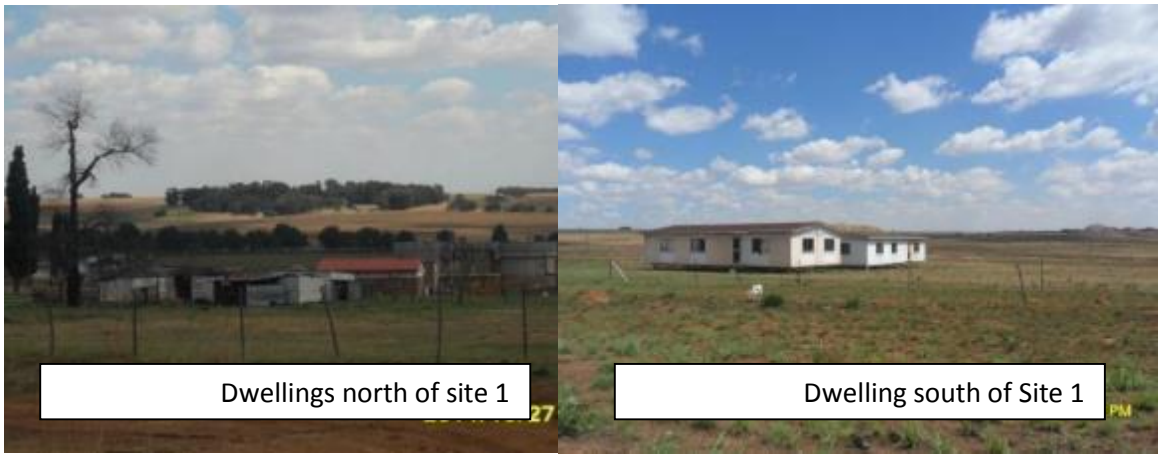

Hostel blocks


Site 1 with edusec being demolished


3 farm workers dwellings adjacent to site 3


Site 3

Rietkuil raceway track



Dwellings north of site 1

Dwelling south of Site 1

Olifantsrivier Oos community Gelofteefees terrein

Tree lined avenue

The below table lists adjacent property owners and their land use.

Table 3-11: Adjacent landowners and land use

PROPERTY DESCRIPTION	LAND OWNER	LAND USE
Rietkuil 491-JS Ptn 0	Exxarro Coal	Mining
Rietkuil 491-JS Ptns 3 and 27	Oosthuizen	Agricultural
Rietkuil 491-JS Ptns 15 and 21	Kleinhans	Agricultural
Rietkuil 491-JS Ptn 22	Optimum Coal	Mining
Rietkuil 491-JS Ptn 31	Eskom Holdings SOC Ltd	Mining
Rietkuil 491-JS Ptn 32	Alkebu –Lan Farmings CC	Agricultural

PROPERTY DESCRIPTION	LAND OWNER	LAND USE
Rietkuil 491-JS Ptn 11	Dingaansfees – Olifantsrivier Oos	Cultural
Nooitgedacht 493-JS Ptns 1, 8 and 19	Van Eeden	Agricultural
Nooitgedacht 493-JS Ptn 9	Swart	Agricultural

3.4 POLICY AND PLANNING ENVIRONMENT

Legislation and policies reflect societal norms and values. The legislative and policy context therefore plays an important role in identifying and assessing the potential social impacts associated with a proposed development.

Policy review provides an insight into government socio-economic objectives, plans, and applicable legislature. This assists in determining the importance and alignment of the project with regard to the developmental objectives of various government spheres. The policy analysis also attempts to identify potential developmental conflicts and social impacts that the project might create.

The following policies are examined hereunder:

- **National (South Africa):**
  - National Spatial Development Perspective (NSDP) (2006)
  - National Industrial Policy Framework (NIPF) (2007)
  - New Growth Path Framework (NGPF) (2010)
  - National Development Plan (NDP) (2011 – 2030)
  - Industrial Policy Action Plan (IPAP2) (2012/2013 – 2014/2015)
  - Integrated Resource Plan (IRP) for South Africa (2010-2030)
  - Spatial Planning and Land Use Management Act (SPLUMA (2013)
  - The National Energy Act (2008)
  - The White Paper on the Energy Policy of the Republic of South Africa (December 1998)
  - The White Paper on Renewable Energy (November 2003);
- **Regional (Mpumalanga):**
  - Mpumalanga Provincial Growth and Development Strategy (PGDS) (2004-2014)
  - Mpumalanga Economic Growth and Development Path (MEGDP) (2011)
- **Local: (Nkangala District Municipality and Steve Tshwete Local Municipality)**
  - Nkangala Local Economic Development Plan (LED)
  - Nkangala Integrated Development Plan (IDP) (2013 and 2014/15)
  - Steve Tshwete Integrated Development Plan (IDP) (2014/15)
  - Steve Tshwete Draft SDF (2010)

3.4.1 NATIONAL LEVEL POLICY AND PLANNING

The IRP (2010) and the NDP emphasise the need to develop the electricity generation sector to support the growth of the national economy and reach its developmental objectives. The NDP recognises that the South African economy is “electricity intensive,” consequently the need for increased generation capacity is essential for economic growth and development. Thus, the NDP aims to avoid economy crippling situations, such as the energy crises experienced by the country in 2008 and that is currently being experienced, by developing new power generation capacity and involving Independent Power Producers. Furthermore, managing the transition towards a low carbon national economy is identified as one of the 9 key national challenges in the NDP.

National government has set the objective of achieving sustainable development through job creation. Additionally, government has set out to reduce the reliance on greenhouse emitting sources of energy in favour of greener energy sources; this applies to industry and business as well. Because the project holds the potential to both create jobs, but also negative effects. The IRP, NDP and NGPF affirm that both positive and negative aspects need to be further investigated in future studies.

One of the objectives of the National Energy Act was to promote diversity of supply of energy and its sources. With regards to solar, the act states "To ensure that diverse energy resources are available, in sustainable quantities, and at affordable prices, to the South African economy, in support of economic growth and poverty alleviation, taking into account environmental management requirements (…); to provide for (…) increased generation and consumption of renewable energies…".

Investment in renewable energy initiatives, such as the proposed Solar plant, is supported by the White Paper on Energy Policy for South Africa (December 1998). In this regard the document notes: "Government policy is based on an understanding that renewables are energy sources in their own right, are not limited to small-scale and remote applications, and have significant medium and long-term commercial potential". "Renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future". The support for renewable energy policy is guided by a rationale that South Africa has a very attractive range of renewable resources, particularly solar and wind and that renewable applications are in fact the least cost energy service in many cases; more so when social and environmental costs are taken into account. Government policy on renewable energy is thus concerned with meeting the following challenges:

- Ensuring that economically feasible technologies and applications are implemented;
- Ensuring that an equitable level of national resources is invested in renewable technologies, given their potential and compared to investments in other energy supply options; and,
- Addressing constraints on the development of the renewable industry.

The White Paper on Energy also acknowledges that South Africa has neglected the development and implementation of renewable energy applications, despite the fact that the country's renewable energy resource base is extensive and many appropriate applications exist.

Advantages noted in the White Paper on Energy include:

- Minimal environmental impacts in operation in comparison with traditional supply technologies; and
- Generally lower running costs, and high labour intensities

Disadvantages noted in the White Paper on Energy include:

- Higher capital costs in some cases;
- Lower energy densities; and
- Lower levels of availability, depending on specific conditions, (especially sun and wind based).

The IRP 2010 also allocates 43% of new energy generation facilities in South Africa to renewables.

The White Paper on Renewable Energy (November, 2003) supplements the White Paper on Energy Policy, which recognizes that the medium and long-term potential of renewable energy is significant. This Paper sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing renewable energy in South Africa. The White Paper on Renewable Energy notes that while South Africa is well-endowed with renewable energy resources that have the potential to become sustainable alternatives to fossil fuels, these have thus far remained largely

untapped. As signatory to the Kyoto Protocol, Government is determined to make good the country's commitment to reducing greenhouse gas emissions. To this purpose, Government has committed itself to the development of a framework in which a national renewable energy framework can be established and operate. South Africa is also a signatory of the Copenhagen Accord. The accord endorses the continuation of the Kyoto Protocol and confirms that climate change is one of the greatest challenges facing the world. In terms of the accord South Africa committed itself to a reduction target of 34% compared to business as usual.

Apart from the reduction of greenhouse gas emissions, the promotion of renewable energy sources is aimed at ensuring energy security through the diversification of supply (in this regard, also refer to the objectives of the National Energy Act). Government's long-term goal is the establishment of a renewable energy industry producing modern energy carriers that will offer in future years a sustainable, fully non-subsidised alternative to fossil fuels.

The outcomes and policy consideration of the IRP include:

- The installation of renewables (solar PV, CSP and wind) were brought forward in order to accelerate a local industry;
- To account for the uncertainties associated with the costs of renewables and fuels, a nuclear fleet of 9,6 GW was included in the IRP;
- The emission constraint of the RBS (275 million tons of carbon dioxide per year after 2024) was maintained; and
- Energy efficiency demand-side management (EEDSM) measures were maintained at the level of the RBS.

The Policy-Adjusted IRP has resulted in an increase in the contribution from renewables from 11,4 GW to 17,8 GW. The key recommendations contained in the Policy-Adjusted IRP Final Report (March 2011) that have a bearing on the solar PV programme 2012-2015 include:

- In order to facilitate the connection of the first solar PV units to the grid in 2012 a firm commitment to this capacity is necessary.
- Furthermore, to provide the security of investment to ramp up a sustainable local industry cluster, the first four years from 2012 to 2015 require firm commitment.
- Solar PV 2016 to 2019: Grid upgrades might become necessary for the second round of solar PV installations from 2016 to 2019, depending on their location.

The key conclusions that are relevant to the renewable energy sector include:

- An accelerated roll-out of renewable energy options should be allowed in order to derive the benefits of localisation in these technologies.
- A solar PV programme as envisaged in the Policy-Adjusted IRP should be pursued (including decentralised generation).

3.4.2 PROVINCIAL AND LOCAL LEVEL POLICY AND PLANNING

There is no specific reference to solar PV plants at Arnot Power station, the realisation that additional energy generation capacity is needed by the country features strongly in all of the regional policies and strategies. The Mpumalanga PGDS (2004-2014) mentions that the current mining and manufacturing industries produce the majority of the province's output but employ relatively few people. The strategy document highlights the importance of mineral beneficiation in the Mpumalanga Province as a means to create employment opportunities and reduce poverty. The MEGDP emphasises the need for growth in the energy and mining sectors with downstream and side stream projects.

The Nkangala DM IDP (Nkangala IDP, 2013) states that the potential to use coal reserves of the region for electricity generation is high. However, in line with the developmental objectives of the Nkangala DM, coal power is seen as an unsustainable and environmentally damaging energy source and it is advised that, where possible, alternatives to heavy polluting industries and energy generation methods should be considered. The proposed plans are to make use of solar power, which is less harmful to the environment than coal-fired technology.

The generation of electricity from mined non- renewable resources requires the use of water and has a pollution risk leaving local communities without or with limited water supply. The MEGDP raises the concerns regarding air and water pollution cause by coal-fired power stations stating that the "impacts are largely felt in Mpumalanga and the surrounding areas." Additionally, the MEGDP indicated that the transport of coal associated with power plants is an issue facing the province. Deteriorating roads and lack of rail capacity may hinder future growth. The proposed PV power generation alternatively, does not entail the use of non-renewable energy sources, but rather harnessing the power of the sun.

The Mpumalanga PGDS has a target that at least 20% of energy use of the Province is renewable by the end of 2014.

The IDP (2014/15) of Steve Tshwete provides no reference to renewable energy. 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 also reveals that in regards to sustainable development that "renewable energy and electricity generation is needed". The SDF also reveals that "provision of solar energy to assist in cooking/heating and for lighting purposes, needs much more attention in future".

The SDF (2010) of Steve Tshwete is currently under review and not yet available at time of undertaking this analysis. The SDF (2010) does not have a spatial plan for the complete Municipality, but focuses on a spatial plan for Middleburg and Hendrina.

Figure 9 below provides an indication of the Nkangala Spatial Development Framework. The Nkaganala SDF reveals that the proposed development is situated next to the Arnot power station surrounding mining and crop farming. Furthermore the land cover, surrounding the study area shows coal mining industry, which operates mainly in the southern part of the municipality, south of the N4 national road. Conflictingly the southern area is also the area in which the highest agricultural potential is found, comprising of arable land under irrigation, mostly comprised of maize farming.

3.4.3 DEGREE OF FIT WITH POLICY AND PLANNING

Based on the analysis of the above policies and strategies, it can be concluded that the proposed solar PV plant achieves a high degree of fit with national energy planning policy with respect to renewable energy which has links to climate change, environmental impact and energy security/flexibility considerations. It also has the potential to contribute to greater energy supply stability and the concept of a solar energy project is broadly supported in local economic planning documents.

South African energy policy has changed rapidly from doing little encourage renewable energy to now actively encouraging it. To facilitate roll-out of renewable energy and meet ambitious targets, various economic incentives have been initiated to encourage investment in renewable energy such as the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). Evident from policy is that solar power requires a greater subsidy than the other forms or renewable energy. The policy case for the urgent roll-out of renewable energy in South Africa has been made at a national and provincial government level. Targets that include solar energy have been set (which may be revised upwards) and significant financial and other incentives have been offered to renewable energy

developers in order to encourage projects and move decisively towards full-cost pricing of energy (i.e. prices which reflect global warming and other environmental impacts).

Economic development imperatives inform spatial planning imperatives. A critical aspect of desirability is thus whether the proposed development complements development planning as reflected in spatial development planning. Integrated Development Plans (IDPs) and their accompanying Spatial Development Frameworks (SDFs) are particularly important in this regard. SDFs in particular are central to development planning and are drawn up in order to guide overall development in a direction that local and provincial authorities see as desirable. Indeed, the basic purpose of an SDF is to specify the spatial implications of IDPs designed to optimise opportunities. Considered as a whole the local documents 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 economic development is recognised.

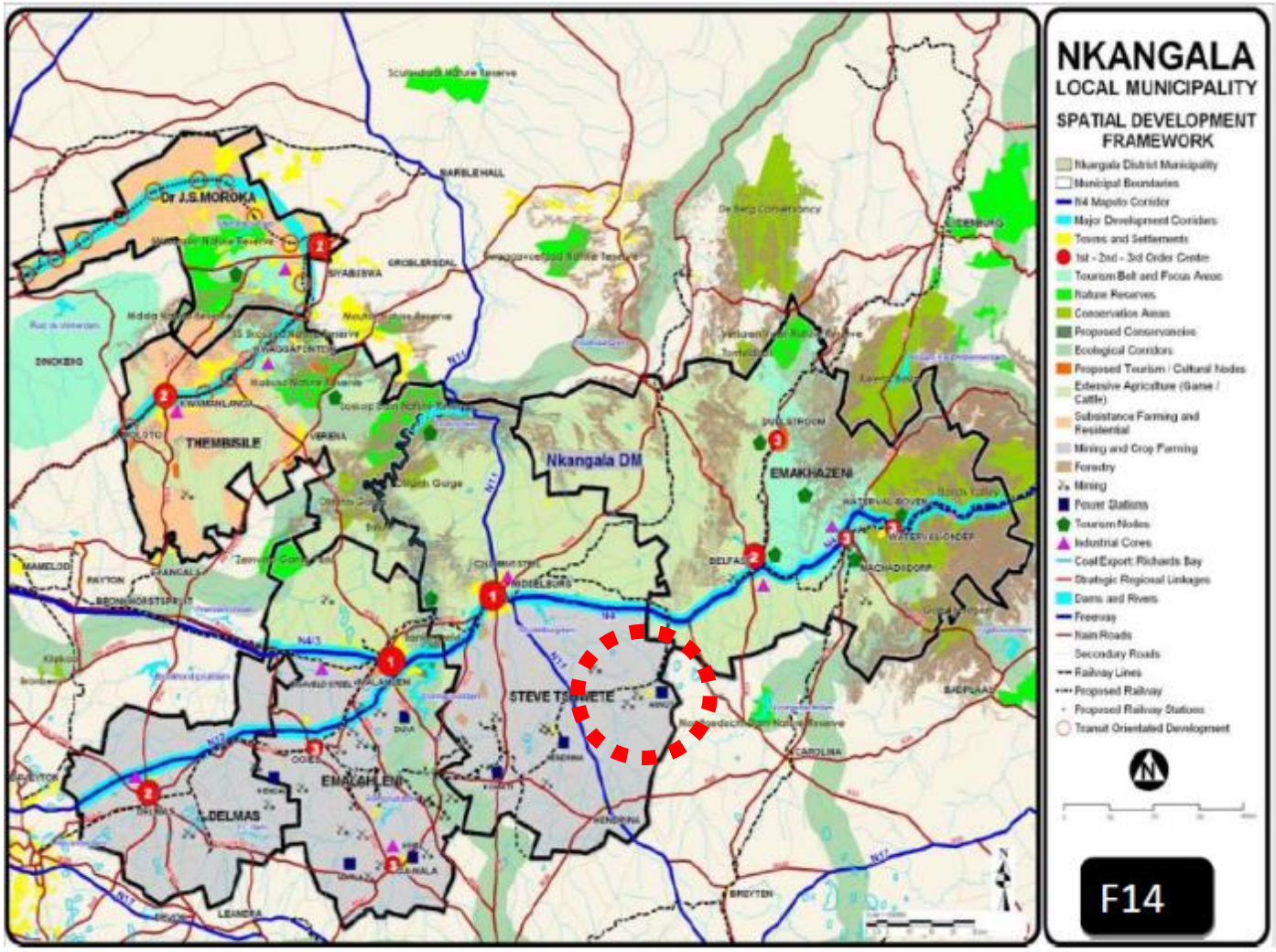
3.5 SUMMARY OF KEY BASELINE FINDINGS

The following is a summary of the key baseline findings as a result of the social baseline conducted on the Steve Tshwete Local Municipality:

Mining activities contribute significantly to local economic production

- Mining activities contribute significantly to local economic production
- A large percentage of the population is living on the poverty line as a result of high unemployment rate, low levels of education and skills, and low income levels, on par with that of the country as a whole
- The nearby Rietkuil settlement and the Rietkuil mine hostels is situated within the immediate vicinity
- Surrounding land uses are mostly mining and agriculture
- Solar energy production is supported by policy and local planning environment and the LM considers it critical to create energy that considers renewable and non-renewable energy sources

Figure 9: Nkangala Spatial Development Framework



Source: eMalahleni Draft SDF (2013/14)

4. SOCIAL IMPACTS ASSESSMENT AND MITIGATIONS

The purpose of this section is to describe the potential social impacts that could be anticipated from the proposed Solar Photovoltaic Power Plant at Arnot Power Station, in Mpumalanga.

The identified social impacts are set out below.

Table 4-1: Identified social impacts per phase

IMPACTS	PHASES			
	Planning	Construction	Operational	Decommissioning
New business sales, multiplier effects and economic stimulation	■	■	■	
Employment and skills transferral	■	■	■	■
In-migration and effect of temporary workers on social dynamics and increased pressure on socio-economic infrastructure and services		■		
Health, safety and security		■	■	
Nuisance, noise, other disruptions, and change in quality of living environment		■		
Visual and land use patterns alteration impact and change in sense of space and other spatial considerations		■	■	■
Impacts on Arnot residents		■	■	
Impacts on agriculture		■	■	■
Development of clean renewable energy			■	

As shown above, the social impacts of the development have been identified on four phases of the project: the planning and design phase, the construction phase, the operational phase, and the decommissioning phase.

The above indicated impacts are discussed in detail hereunder for each of the development phases.

4.1 NEW BUSINESS SALES, MULTIPLIER EFFECTS AND ECONOMIC STIMULATION

The injection of income into the area in the form of both wages, and new business sales will represent some opportunity for economic growth in the country.

Direct impacts would include the creation of new jobs for construction workers and the associated income generated by the solar project. Indirect and induced impacts would occur as a result of the new economic development, and would include new jobs at businesses that support the expanded workforce or provide project materials, and associated income.

New business sales, albeit limited for the local economy will occur, which refers to the value of all inter- and intra-sectoral business sales generated in the economy as a consequence of the introduction of an exogenous change in the economy. In layman's terms, new business sales equate to additional business turnover due to change in the economy, which means that over and above the

originally invested money during the construction phase, revenue is generated due to the multiplier effect in the different sectors of the economy. The sectors that will experience the highest demand for additional output are manufacturing (i.e. supply of building materials during construction, trade (i.e. supply of final goods and services), finance, and business services (i.e. professional services).

In short, it is expected that the proposed development will lead to positive, albeit low, impacts on the economy, which will lead to increased business sales, increased employment opportunities, increased government income, and increased standards of living.

Increased employment is associated with increased income and consequently with increased buying power in the area, thus leading to new business sales. With the increased employment and a subsequent increase in monthly income, increased business opportunities can be experienced.

This impact is essentially relevant to the following phases:

- Planning phase
- Construction phase
- Operational phase

4.1.1 NEW BUSINESS SALES AND ECONOMIC STIMULATION – PLANNING

During the **planning and design phase**, a number of non-local consultants such as environmental practitioners, architects, engineers, town and regional planners, development economists, heritage specialists, etc. have been employed to do preliminary assessments and planning to plan for the proposed development.

Table 4-2: Summary of impact of new business sales and economic stimulation – planning phase

PHASE: PLANNING PHASE		
NATURE: New business sales, multiplier effects and economic stimulation		
CAN IMPACTS BE MITIGATED	NO	
IMPACT ASSESSMENT	**WITHOUT MITIGATION**	**WITH MITIGATION**
MAGNITUDE	MINOR	N.A
DURATION	IMMEDIATE	N.A
EXTENT	NATIONAL	N.A
PROBABILITY	HIGHLY PROBABLE	N.A
SIGNIFICANCE	LOW (28)	N.A
STATUS	POSITIVE	N.A
ENHANCEMENT MEASURES: N.A		
CUMULATIVE IMPACTS: N.A		
RESIDUAL IMPACTS: None		
ASSESSMENT OF NO-GO OPTION: There is no impact as it maintains the current status quo. However, the no-go option would represent a lost socio-economic opportunity for the region.		

The **impact assessment** during the planning phase is assessed to be positive; minor in intensity; immediate in duration; national in extent (as none of the consultants are from the local region or Province); and highly probable. The impact is assessed to be of a low positive significance to the decision making process.

With regards to **site alternatives** there is no difference in impact between site 1 and 3 in regards to new business sales during the planning phase.

4.1.2 NEW BUSINESS SALES AND ECONOMIC STIMULATION – CONSTRUCTION

During the **construction phase**, the project has the potential to have a positive impact on economic activity in the local area, region, province, nationally, and internationally given the size of the new spending injection associated. Preliminary estimates indicate that a total of approximately **R306 million** (2015 Rand values) will be spent on the entire construction phase representing a significant investment.

There is however also a need for imports as PV modules and inverters will probably be manufactured in China, and assembled in South Africa. Which is why new business sales and economic stimulation will have an international extent. Currently import content is high for all solar energy projects. However, if the South African solar energy programme grows in size it should provide opportunities for local manufacturing and servicing at scale and the additional benefit that would flow from it. This is however, not possible in the ambits of this project.

There are also likely to be economic multiplier effects, albeit limited locally, from the use of national goods and services which includes, but is not limited to, construction materials and equipment and workforce essentials such as food, clothing, safety equipment, and other goods. Off-site accommodation would also be required for those construction staff not located in the area, and there is a large amount of accommodation available in Hendrina, Middelburg, Witbank, and possibly even Rietkuil.

Transport services to the site from town would also be required as there is limited public transport in the area. This additional spend would provide an indirect boost to the local economy.

In other words, over and above the originally invested money during the construction phase, additional revenue is generated due to the multiplier effect in the different sectors of the economy.

An indicator that is used to indicate economic growth and value is the Gross Domestic Product per Region (GDP-R). The proposed development will translate to economic contribution and income generation which will result in an increase in the GDP-R. The capital investment will have a positive impact on the economy, since it will trigger other beneficial economic activities.

It is anticipated that the economy will be stimulated in the following ways:

- Increased financial spending.
    - Expenditure on resources that is required for the construction of the development to take place. These include the purchasing of building material, payment of services provided and infrastructure etc.;
- Increased expenditure by construction workers.
    - Income that would be earned by employees would be mostly spent within the region;

The capital investment will thus have a positive impact to the economy, since it will trigger other beneficial economic activities, equate to additional new business turnover and GDP.

The construction phase will thus clearly have a positive impact on the economy due to increased financial spending in the economy related to increased infrastructure investment; civil construction; and increased expenditure by employees.

The local area and its activities (businesses and shops, etc.) are expected to be stimulated economically, due to the increased spending expected from the increased salaries and wages paid to employees during construction. Service industries in the region will thus benefit from this, which, in turn will have a knock-on effect on suppliers of goods and services in other areas. This positive impact is likely to be experienced in terms of the increased markets for the sale of local goods to construction staff and direct employment by construction contractors.

All of this will have a positive impact due to the increased direct employment by construction contractors, as well as stimulation of local businesses and informal traders such as tuck shops and spaza shops that will be frequented by the construction labourers during the day. This impact will be a medium term impact and will only be evident until the construction phase is complete.

The proposed development will also lead to increased government income which can be seen as an economic injection into the area. An increase in government income is generated from an increase in the tax base and an increase in economic activity (i.e. domestic investment). The budgeted capital investment for the project would be injected into the economy, thereby causing a positive economic impact that leads to fiscal impacts. Fiscal impacts are changes in government revenues and expenditures. Economic impacts on total business sales, wealth or personal income can affect government revenues by expanding or contracting the tax base. Due to the jobs that will be created as a result of the proposed development, as well as the increased business activity levels, the salaries and wages of those jobs along with the increased turnover of the companies, can be translated into increased personal and business income tax. In other words, government income will be increased as result of the increase in tax it will receive from the proposed development. The increased government income from tax will mostly be as a result of increased economic activity. Increased tax received by the government will be in the form of: company tax, unemployment insurance fund, rates and taxes, etc.

Table 4-3: Summary of impact of new business sales and economic stimulation – construction

PHASE: CONSTRUCTION PHASE		
NATURE: New business sales, multiplier effects and economic stimulation		
CAN IMPACTS BE MITIGATED	YES	
IMPACT ASSESSMENT	**WITHOUT MITIGATION**	**WITH MITIGATION**
MAGNITUDE	LOW	LOW
DURATION	SHORT-TERM	SHORT-TERM
EXTENT	INTERNATIONAL	INTERNATIONAL
PROBABILITY	HIGHLY PROBABLE	HIGHLY PROBABLE
SIGNIFICANCE	MEDIUM (44)	MEDIUM (44)
STATUS	POSITIVE	POSITIVE
ENHANCEMENT MEASURES: • It is recommended that a local procurement policy be adopted to maximise the benefit to the local economy. • Eskom should seek to develop a database of local companies, specifically Broad Based Black Economic Empowerment (BBBEE) companies, which qualify as potential service providers (e.g. construction companies, security etc.) prior to the commencement of the tender process for construction contractors. These companies should be notified of the tender process and invited to bid for project-related work.		

PHASE: CONSTRUCTION PHASE
• To source as much good and services as possible from the local area; engage with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods and products from local suppliers where feasible.
CUMULATIVE IMPACTS: The establishment of a number of renewable energy facilities in and around the area will create employment, skills development and training opportunities, creation of downstream business opportunities and stimulation of the economy.
RESIDUAL IMPACTS: None
ASSESSMENT OF NO-GO OPTION: There is no impact as it maintains the current status quo. However, the no-go option would represent a lost socio-economic opportunity for the region.

The **impact assessment** during the construction phase is assessed to be positive; low in intensity without enhancement and moderate in intensity with enhancement; short-term in duration; local, district, provincial, national, and international in extent; and highly probable. The impact is assessed to be of a medium positive significance both without and with enhancement to the decision making process.

With regards to **site alternatives** estimated construction cost will differ between site 1 and 3. Site 1 will have the largest construction cost and thus larger positive impact in terms of scope than site 3. Site 3 is approximately half the size of site 1 and is expected to have the least capital expenditure and the lowest positive impact on new business sales during the construction phase. Site 3 is expected to have a low positive significance.

4.1.3 NEW BUSINESS SALES AND ECONOMIC STIMULATION – OPERATIONS

During the **operations phase**, the economy will be stimulated although to a far smaller degree since operational expenditure is expected to be significantly lower than the construction phase. Additional energy generation, has knock-on effects on economic stimulation, income generation, etc. Note however that long term positive impacts can only flow from the project if it is financially sustainable (i.e. financially viable in the long term with enough income to cover costs). The opportunity costs also need to be taken into consideration in this regard. The opportunity costs associated with the development of the site for solar energy can be defined as the potential foregone benefits that would be associated with the next best alternative land use. In the study area this means essentially continued no use. However, given energy requirements of Eskom, the use of renewable energy to supplement Arnot Power station energy needs, as opposed to use from potential energy for the grid from non-renewable resources is potentially key for continued operations.

Table 4-4: Summary of impact of new business sales and economic stimulation – operation phase

PHASE: OPERATION PHASE		
NATURE: New business sales, multiplier effects and economic stimulation		
CAN IMPACTS BE MITIGATED	NO	
IMPACT ASSESSMENT	**WITHOUT MITIGATION**	**WITH MITIGATION**
MAGNITUDE	MINOR	N.A
DURATION	LONG-TERM	N.A

PHASE: OPERATION PHASE		
EXTENT	LOCAL	N.A
PROBABILITY	MEDIUM PROBABILITY	N.A
SIGNIFICANCE	LOW (24)	N.A
STATUS	POSITIVE	N.A
ENHANCEMENT MEASURES: N.A		
CUMULATIVE IMPACTS: N.A		
RESIDUAL IMPACTS: None		
ASSESSMENT OF NO-GO OPTION: There is no impact as it maintains the current status quo. However, the no-go option would represent a lost socio-economic opportunity for the region.		

The **impact assessment** during the operation phase is assessed to be positive; minor in intensity; long-term in duration; local in extent; and medium probability. The impact is assessed to be of a low positive significance to the decision making process.

With regards to **site alternatives** there is only a marginal difference in impact between site 1 and 3 in regards to new business sales during the operation phase. Most notably site 3 which is nearly half the size and scope of site 1 would have a lower overall significance score, albeit still with a low positive significance.

4.2 EMPLOYMENT AND SKILLS TRANSFER

The proposed employment opportunities from the development, and those that will arise from new business sales, albeit not all local, will be positive. In additional to employment, the proposed development also holds the potential for skills transfer. This impact is essentially relevant to the following phases:

- Planning phase
- Construction phase
- Operational phase
- Decommissioning phase

4.2.1 EMPLOYMENT AND SKILLS TRANSFER – PLANNING

This phase implies the procurement of professional services of amongst others, environmental practitioners, architects, town and regional planners, development economists etc. that in most likelihood are not situated within Steve Tshwete, but probably within Gauteng. During this phase the amount of employment opportunities are limited and only temporary.

Table 4-5: Summary of impact of employment and skills transfer– planning phase

PHASE: PLANNING PHASE		
NATURE: Employment and skills transfer		
CAN IMPACTS BE MITIGATED	NO	
IMPACT ASSESSMENT	**WITHOUT MITIGATION**	**WITH MITIGATION**
MAGNITUDE	MINOR	N.A

PHASE: PLANNING PHASE		
DURATION	IMMEDIATE	N.A
EXTENT	NATIONAL	N.A
PROBABILITY	MEDIUM PROBABILITY	N.A
SIGNIFICANCE	LOW (21)	N.A
STATUS	POSITIVE	N.A
ENHANCEMENT MEASURES: N.A		
CUMULATIVE IMPACTS: N.A		
RESIDUAL IMPACTS: Improved knowledge and skills transfer		
ASSESSMENT OF NO-GO OPTION: There is no impact as it maintains the current status quo. However, the no-go option would represent a lost opportunity for skills development for the country.		

The **impact assessment** during the planning phase is assessed to be positive; minor in intensity; immediate in duration; national in extent; and medium probability. The impact is assessed to be of a low positive significance to the decision making process.

With regards to **site alternatives** there is no difference in impact between site 1 and in regards to employment generation and skills transfer during the planning phase.

4.2.2 EMPLOYMENT AND SKILLS TRANSFER – CONSTRUCTION PHASE

Employment generation reflects the number of jobs created or lost as a result of the exogenous change in the economy. Note that a job is defined as one person employed for one year. The construction period of this project is assumed up to 12 months, and the peak construction period can be up to 6-8 months during which the core construction activity will be undertaken.

Quantification of the exact number of employment during the construction phase is difficult, as it depends on the level of skills and resources of the contractor. Nonetheless, an indication of the possible figures are provided in order to put the size of the construction impact on employment into perspective. This is based on:

- Previous experience in South Africa,
- A study undertaken by the Department of Trade and Industry (theDti), entitled 'The localisation potential of Photovoltaics (PV) and a strategy to support large scale roll-out in South Africa' which reveals an estimated 11 jobs per MW of installation (2013),
- A study undertaken by National Treasury, entitled 'Impact assessment of expenditure on 3725 MW renewable energy programme' which reveals a direct employment share of approximately 25% from PV power plants (2011), and
- Indications from Eskom regarding estimated man-days.

Based on size of employment per production from the Department of Trade and Industry (theDti, 2013), for the 17 MW plant (site alternative 1), approximately 190 people can be expected to be employed during the construction period. Note however that this is total job creation (nationally and internationally) and includes, direct, indirect and induced jobs due to the multiplier effects. The localisation (South African) potential of jobs, based on the Department of Trade and Industries report (2013), however assumes a potential local job creation of 5.8 person per MW. Based on the proposed 17 MW plant, the total South African job creation can be assumed to be around 100 jobs during the construction period. The direct potential of jobs, based on the National Treasury report (2011), reveals

an approximate 25% direct impact, which means that the direct employment is estimated at approximately 25 direct jobs. This is in line with the estimated man-days during the duration of the construction phase, namely 5400 man-days, which equates to approximately 22 man-year employment opportunities.

Note however, not all these employment opportunities are necessarily available for employment of local workforce within the immediate surrounds of the project. The actual number is also likely to vary based on final designs and size of the proposed project, as well as based on the level of skills and resources of the contractor. Nonetheless, even though the exact number of employment opportunities is not known, the construction of the proposed project will require a workforce, albeit limited, and therefore direct employment will be generated. This is therefore a positive social impact.

In terms of skills requirements, it is common that highly skilled or skilled labour such as engineers, technical staff and project managers will constitute about 30% of the work force; semi-skilled staff would typically be required to operate machinery and this will constitute about 10% of employees; while the remainder will be low skilled construction and security staff that will constitute about 60% of the work force. It is likely that some of the low skilled workforce could be employed from the surrounding area. The level of education in the Local Municipality is poor which is linked to limited skills base. This is combined with a high level of unemployment. Although the more specialised tasks are likely to require skills from outside the Local Municipal area, there are potential opportunities for low skilled (construction and security workers) staff which would require associated training.

The injection of income into the area in the form of wages will represent a growth opportunity for the local economy and businesses in the area.

During the construction phase, the employment opportunities would be temporary in nature. The increased employment in the area will also result in increased expenditure, which will mean that more than just the proposed direct jobs required for the construction will be created due to the economic spin-offs. It is important to realise that the construction impact is experienced during the construction and development period. Thus, it is only sustainable for the duration of the development phase. Once the development phase nears its end, the construction impact will diminish.

The benefit of increased jobs can also be translated into economic terms. The additional jobs would in essence result in additional income creation. This increase in income in the area can be translated in a specific impact ranging from Broad Based Black Economic Empowerment (BBBEE) to poverty alleviation depending on the procurement policy and the construction technology applied.

In all likelihood, skills will be transferred in the form of on the job training during the construction phase. These skills will enable these individuals to seek other construction and related employment once the construction phase is complete. The construction related work opportunities could also lead to capacity building. Capacity building refers to the conscious increasing of knowledge, networking capability and the skills base.

Table 4-6: Summary of impact of employment and skills transfer– construction phase

PHASE: CONSTRUCTION PHASE		
NATURE: Employment and skills transfer		
CAN IMPACTS BE MITIGATED	YES	
IMPACT ASSESSMENT	**WITHOUT MITIGATION**	**WITH MITIGATION**
MAGNITUDE	LOW	LOW
DURATION	SHORT-TERM	SHORT-TERM

PHASE: CONSTRUCTION PHASE		
EXTENT	NATIONAL	NATIONAL
PROBABILITY	MEDIUM	HIGH
SIGNIFICANCE	MEDIUM (30)	MEDIUM (40)
STATUS	POSITIVE	POSITIVE
ENHANCEMENT MEASURES: • Where reasonable and practical the contractors appointed by the proponent should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. However, due to the low skills levels in the area, the majority of skilled posts are likely to be filled by people from outside the area. • Opportunities for training of workers should be maximised • Ways to enhance local community benefits with a focus on broad based BEE need to be explored • Local construction companies should be used whenever possible, especially for subcontracting work. • Local suppliers should be used as far as possible. • Labour based construction methods should be used whenever practically possible. It is important to follow the principles of the Expanded Public Works Programme and apply effective labour-based construction technologies in order to increase the job creation effects. • The use of local labour should be approached in such a manner that large numbers of local residents can benefit from this action rather than only a select few. • Note that while preference to local employees and companies is recommended, it is recognised that a competitive tender process may not guarantee the employment of local labour for the construction phase.		
CUMULATIVE IMPACTS: Opportunity to upgrade and improve knowledge and skills transfer in the area		
RESIDUAL IMPACTS: Improved pool of skills and experience in the region		
ASSESSMENT OF NO-GO OPTION: The potential employment benefits associated with the construction would be forgone. The potential opportunity costs in terms of the capital expenditure, employment, skills development, and opportunities for local business are therefore regarded as a negative.		

The **impact assessment** during the construction phase is assessed to be positive; low in intensity; medium in duration; national in extent; and medium or high probability depending on enhancement aspects employed. The impact is assessed to be of a medium positive significance to the decision making process both with and without enhancement.

With regards to **site alternatives** there is only a marginal difference in impact between site 1 and 3 in regards to employment during the construction phase. Most notably site 3 which is nearly half the size and scope of site 1 would have a lower overall significance score, albeit still with a medium positive significance.

4.2.3 EMPLOYMENT AND SKILLS TRANSFER – OPERATIONS PHASE

The operation phase of the Project will require a very small direct workforce, and it is probable that this could all be undertaken by existing Eskom staff. Routine activities would include operation of the solar facility to produce power, and regular monitoring and maintenance activities to ensure safe and consistent operation. Maintenance would probably need to be carried out throughout the lifetime of the Solar Energy plant. Typical activities during maintenance include washing solar panels routinely (in the evening) and vegetation control and maintenance. Indirect and induced job creation potential, albeit very small, also exists from the increased energy production during the operation phase.

Table 4-7: Summary of impact of employment and skills transfer– operations phase

PHASE: OPERATIONS PHASE		
NATURE: Employment and skills transfer		
CAN IMPACTS BE MITIGATED	NO	
IMPACT ASSESSMENT	**WITHOUT MITIGATION**	**WITH MITIGATION**
MAGNITUDE	MINOR	N.A
DURATION	LONG TERM	N.A
EXTENT	LOCAL	N.A
PROBABILITY	MEDIUM	N.A
SIGNIFICANCE	LOW (24)	N.A
STATUS	POSITIVE	N.A
ENHANCEMENT MEASURES: None		
CUMULATIVE IMPACTS: None		
RESIDUAL IMPACTS: Improved pool of skills and experience in the region		
ASSESSMENT OF NO-GO OPTION: There is no impact as it maintains the current status quo. However, the no-go option would represent a lost opportunity for development for the region.		

The **impact assessment** during the operation phase is assessed to be positive; minor in intensity; long-term in duration; national in extent; and medium probability. The impact is assessed to be of a low positive significance to the decision making process.

With regards to **site alternatives** there is no difference in impact between site 1 and 3 in regards to employment generation and skills transfer during the operation phase. Based on the limited operational staff required, it is for instance probable that operations require the same amount of security staff whether or not site, 1 or 3 is developed.

4.2.4 EMPLOYMENT AND SKILLS TRANSFER – DECOMMISSIONING PHASE

The major social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income. This has implications for the households who are directly affected, the communities within which they live, and the relevant local authorities. However, in the case of the proposed facility the decommissioning phase is likely to involve the disassembly and replacement of

the existing components with more modern technology. This is likely to take place in the 25 years post commissioning. It is anticipated that the decommissioning phase is therefore likely to create additional, construction type jobs, as opposed to the jobs losses typically associated with decommissioning however for a limited period of time. Given the relatively small number of people to be employed during the operation phase, the social impacts at a community level associated with decommissioning are likely to be limited/negligible. In addition, potential impacts associated with the decommissioning phase can be effectively managed with the implementation of a retrenchment and downscaling programme.

Table 4-8: Summary of impact of employment and skills transfer– decommissioning phase

PHASE: DECOMMISSIONING PHASE		
NATURE: Loss of employment		
CAN IMPACTS BE MITIGATED	YES	
IMPACT ASSESSMENT	**WITHOUT MITIGATION**	**WITH MITIGATION**
MAGNITUDE	NEGLIGIBLE/MINOR	NEGLIGIBLE/MINOR
DURATION	PERMANENT	PERMANENT
EXTENT	LOCAL	LOCAL
PROBABILITY	LOW	LOW
SIGNIFICANCE	LOW (NEUTRAL)	LOW (14)
STATUS	NEUTRAL	POSITIVE
ENHANCEMENT MEASURES: • All structures and infrastructure associated with the proposed facility should be dismantled and transported off-site on decommissioning.		
CUMULATIVE IMPACTS: Decommissioning can also create short term, temporary employment opportunities associated with dismantling etc.		
RESIDUAL IMPACTS: Loss of jobs and associated loss of income, can impact on local economy and other businesses.		

The **impact assessment** during the operation phase is neutral without enhancement and positive with enhancement; minor in intensity; permanent in duration; local in extent; and medium probability. The impact is assessed to be of a low neutral significance to the decision making process with enhancement and low positive with enhancement.

With regards to **site alternatives** there is no difference in impact between site 1 and 3 in regards to decommissioning during the operation phase. However, if mitigated the low positive impacts associated with job creation from dismantling all structures and infrastructure associated with the proposed facility is expected to be slightly higher for site 1 then compared to site 3.

4.3 IN-MIGRATION AND EFFECT OF TEMPORARY WORKERS ON SOCIAL DYNAMICS AND INCREASED PRESSURE ON SOCIO-ECONOMIC INFRASTRUCTURE AND SERVICES

Given the low employment during operations, this impact is essentially only relevant during the construction phase, which is temporary and estimated to last approximately 12 months.

The contractors are to be based at the contractor's yard, which is required for stockpiling excavation material, storing of equipment and erection of the temporary site offices. The contractor's yard shall be situated within the proposed footprint of the PV plant. No accommodation will be provided for contractors on site.

The following onsite facilities can be expected:

- Chemical toilets
- Cloakroom
- Lockable containers to store tools and equipment
- Access to water
- Access to electricity
- Site office
- Sufficient laydown area

The presence of the construction workers is however not expected to pose major potential risks to social networks in the area, specifically to the local community of Arnot hostel residents and Rietkuil, in that the estimated workforce is not substantial (see previous impact). Demographic impacts include the number of new temporary residents associated with the development, the density and distribution of people and any changes in the composition of the population, (e.g., age, gender, ethnicity, wealth, income, occupational characteristics, educational level, health status, etc). Development invites growth in new jobs in a community and draws new workers and their families into the community, either as permanent or temporary residents. When this occurs, the incoming population could affect the social environment in various ways including increased demand for housing and social services (e.g., health care, day care, education, recreational facilities).

While the presence of construction workers does not in itself constitute a social impact, the manner in which construction workers conduct themselves could affect the local community. An increase in population size can have a variety of social impacts, which ranges from impacts on individuals or households, to impacts on the community. These impacts, depending on the level of in-migration, can for example include:

- **Impacts on individuals or households:**
  - Reduced level of health;
  - Reduced mental health;
  - Increased stress, anxiety, alienation, apathy, depression;
  - Uncertainty about impacts, development opportunities, about own life as a result of social change;
  - Reduced actual personal safety, increased hazard exposure; and
  - Reduction in perceived quality of life (subjective well being).
- **Impacts at community level**
  - Reduced adequacy of infrastructure (water supply, sewerage, services and utilities);
  - Reduced adequacy of community social infrastructure, health, welfare and education facilities;
  - Reduced adequacy of housing; and
  - Increased workload on institutions.

The impact of in-migration as a direct result of the proposed development is expected to occur on a minimal scale during the construction phases of the proposed development. During the **construction phase**, it is also expected that there will be an increase of (temporary) construction workers moving into the area. It should be mentioned, however, that in environments where housing and employment opportunities are a scarce resource, it is difficult to mitigate the impact of in-migration.

The construction phase is expected to extend over a period of 12 months, and depending on the final design and contractor's appointment, is expected to create approximately 25 direct employment opportunities. Of this, slightly more than half is expected to be available for low-skilled workers (construction labourers, security staff etc.). Depending on the contractors and their use of local labour, it is reasonable to assume that some of the low skilled workers, could be sourced locally. In addition, given the area's history in energy generation, there are also likely to be locals who qualify for the skilled positions. Employing members from the local community to fill the semi and low-skilled job categories will reduce the risk posed by construction workers to local communities.

While the estimated construction workers from outside, which could be all of the required workforce, is overall likely to be low, the potential threat posed by construction workers to the community as a whole is also likely to be low. However, the impact on individual members who are affected by the behavior of construction workers has the potential to be high, specifically if they are affected by Sexually Transmitted Diseases (STDs), etc.

However, the degree to which society is disrupted largely depends on the level of local employment achievable and in the case of this proposed development, a portion of the workforce could potentially be sourced locally. Nonetheless, the overall number of workforce required is not significant.

Table 4-9: Summary of impact of temporary workers on social dynamics and increased pressure on infrastructure and services– construction phase

PHASE: CONSTRUCTION PHASE		
NATURE: In-migration of temporary workers and effect on social dynamics of area and increased pressure on socio-economic infrastructure and services		
CAN IMPACTS BE MITIGATED	YES	
IMPACT ASSESSMENT	**WITHOUT MITIGATION**	**WITH MITIGATION**
MAGNITUDE	MINOR	NEGLIGIBLE
DURATION	SHORT-TERM	SHORT-TERM
EXTENT	LOCAL	LOCAL
PROBABILITY	MEDIUM	IMPROBABLE
SIGNIFICANCE	LOW (18)	LOW (4)
STATUS	NEGATIVE	NEGATIVE/NEUTRAL
ENHANCEMENT MEASURES: • Employment criteria should be communicated to the community in advance (e.g. in newspapers, community forum notice boards, etc); • Local, unemployed labour should be employed as far as possible; • Accommodation for non-local members of the workforce, should as far as practically possible be arranged so that unskilled labourers are not left to their own device in which case non-local labourers are likely to accommodate themselves in Rietkuil; • The only semi-permanent structures that should be allowed on site is guard houses for security personnel; • Where possible, Eskom should consider to make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically semi and low-skilled job categories. This will reduce the potential impact that this category of worker could have on local family and social networks.		

PHASE: CONSTRUCTION PHASE
• The movement of construction workers on and off the site should be closely managed and monitored by the contractors. In this regard the contractors should be responsible for making the necessary arrangements for transporting workers to and from site on a daily basis. • The contractor should make necessary arrangements to enable workers from outside the area to return home over weekends and or on a regular basis during the construction phase. This would reduce the risk posed by non-local construction workers to local family structures and social networks. • The contractor should make the necessary arrangements for ensuring that all non-local construction workers are transported back to their place of residence once the construction phase is completed. • An employee induction programme should be considered to issues such as HIV/ AIDS and TB as well as alcohol and substance abuse. The induction should also address a code of conduct for employees that would align with community values.
CUMULATIVE IMPACTS: Impacts on family and community relations may in some cases persist for a long period. In cases were unplanned pregnancies, member affected by an STD, the impacts may be permanent and have a long term to permanent cumulative impact on the affected individuals and/or for the families and the community. Furthermore additional pressure on infrastructure due to additional people in the area can be expected. No other developments are planned in the area so the potential for this to be exacerbated is limited.
RESIDUAL IMPACTS: Community members affected by STDS and associated impact on local community and burden on services.
ASSESSMENT OF NO-GO OPTION: No negative impact as the status quo remains.

The **impact assessment** during the construction phase is assessed to be minor in intensity without mitigation; short-term in duration; local in extent; and a medium probability without mitigation. The impact is assessed to be of a low negative significance to the decision making process without enhancement and with enhancement low negative to neutral.

With regards to **site alternatives** there is only a slight difference in impact between the sites. Site 3 is potentially slightly better located in regards to potential impacts from in-migration of temporary workers as it is located slightly further away from the Arnot hostels.

4.4 HEALTH, SAFETY AND SECURITY IMPACTS

This impact is essentially relevant to the following phases:

- Construction phase
- Operational phase

4.4.1 HEALTH, SAFETY AND SECURITY – CONSTRUCTION

The influx of workers into the area especially non-local job seekers could lead to a temporary increase in the level of crime during the construction phase. Apart from everyday safety and security concerns, it is normal during most construction phases and construction activities to experience an increase of persons in search of employment.

An increase in traffic can be expected from the rise in construction vehicles, especially considering that with peak delivery, up to fifty additional vehicles can be expected to operate on site during the material delivery and construction process. Note however that the material delivery vehicles will not be there all the time during the construction period. It can be assumed that the majority of trucks for delivering materials will run during the first 2-6 months of the construction period. Furthermore, on average approximately 10 - 15 trucks per day can be expected during first 2-4 months of period. After the material delivery period, 3-5 trucks per day can be expected during the remaining construction period, namely 6 to 12 months.

The proposed sites are accessible via the entrance to Arnot Power station which is also the entrance to Rietkuil. The movement of construction related activities along the Old Bethal Road does have the potential to impact other road users, albeit minimally so. In this regard, it is suggested that construction activities access site 1 and 3 through the main road to the south of the sites and not through the Arnot Power station.

Other safety concerns evident during the construction phase, relate to the physical nature of the actual construction labourers as they undergo health and safety risks. These include:

- Over exposure to the sun
- Heat stroke and exhaustion
- Dehydration
- Risk of slipping and falling from structures
- Risk of injuries while operating heavy machinery/vehicles
- Etc.

Table 4-10: Summary of impact of health, safety and security - construction phase

PHASE: CONSTRUCTION PHASE		
NATURE: Health, safety and security		
CAN IMPACTS BE MITIGATED	YES	
IMPACT ASSESSMENT	**WITHOUT MITIGATION**	**WITH MITIGATION**
MAGNITUDE	MINOR	NEGLIGIBLE
DURATION	MEDIUM TERM	MEDIUM TERM
EXTENT	LOCAL	LOCAL
PROBABILITY	LOW	IMPROBABLE
SIGNIFICANCE	LOW (18)	LOW (4)
STATUS	NEGATIVE	NEGATIVE/NEUTRAL
ENHANCEMENT MEASURES: • Safety at and around the construction site should be ensured by limiting any risks, fencing off the construction area to avoid unauthorised access and employing security personnel		

PHASE: CONSTRUCTION PHASE
• It is specifically recommended that site 1 and 3, be accessed for construction activities through the main road to the south of the sites and not through the Arnot Power station. The construction activities at all sites also need to be fenced off so that construction workers do not wonder over to residents and or hostel dwellers at Arnot. • Employing local community members could minimise the potential for criminal activity or perceived perception of an increase in criminal activity due to the presence of an outside workforce and influx of people • Working hours should be kept between 7am and 5pm • The perimeter of the construction site should be appropriately secured to prevent any unauthorised access to the site; the fencing of the site should be maintained throughout the construction period • No unauthorised entry to the site is to be allowed; access control and a method of identification of site personnel are required at all times • Security lighting should be implemented • The contractor must ensure that open fires on the site for heating, smoking or cooking are not allowed except in designated areas • A comprehensive employee induction programme would cover land access protocols, road safety, etc • All vehicles must be road worthy and drivers must be qualified and made aware of the potential road safety issues and follow the speed limits. • Adequate signage along the road leading to the Power station and Rietkuil needs to be provided to warn motorists of the construction activities taking place • Risks that labourers undergo during the construction of the proposed development can be minimised by ensuring that proper safety gear are administered and safety precautions are taken. Basic concepts and information should be communicated to labourers so that they are well informed of the risks of over exposure to the sun and stay hydrated throughout the construction phase. • To minimise the risk of petty crime and violent behaviour, proper procedures such as screening prior to hiring should be undertaken, and proper monitoring procedures should be adhered to during this phase. • Design, implement and enforce an appropriate Safety, Health and Environment programme that includes the use of Personal Protective Equipment to ensure the wellbeing of workers. • Establish a code of conduct for construction workers with strict control measures; • Liaise with the South African Police Services in order to implement effective crime prevention strategies. • Liaise with existing forums in the community to communicate information to the community and to assist in the monitoring of compliance. • Aim to appoint as many locally unemployed from Rietkuil to lessen risk of unacceptable social behavior. • Ensure that any unlawful occupants on Eskom owned property, especially those residing north of site 3 and next to the sewerage works are evicted.

PHASE: CONSTRUCTION PHASE
CUMULATIVE IMPACTS:
Not applicable no other known developments in the area.
RESIDUAL IMPACTS:
Psychological effects associated with criminal related events.
ASSESSMENT OF NO-GO OPTION:
No negative impact as the status quo remains.

The **impact assessment** during the construction phase is assessed to be low in intensity without mitigation; short-term in duration; local in extent; and a low probability without mitigation. The impact is assessed to be of a low negative significance to the decision making process without enhancement and with enhancement low negative to neutral.

With regards to **site alternatives**, construction activities at site 1 pose slightly higher risks to safety and security of Arnot residents. In this regard site 3 offers slightly reduced risks to safety and security. Unlawful occupants currently occupying dwellings north of site 3 and adjacent to the sewerage works need to be evicted.

4.4.2 HEALTH, SAFETY AND SECURITY – OPERATION

During the **operational phase** the safety and security impact will mainly be concentrated within the existing secured site and locally.

With regards to health impacts, the generation of electricity from photovoltaic (PV) solar panels is safe and effective. Because PV systems do not burn fossil fuels they do not produce the toxic air or greenhouse gas emissions associated with conventional fossil fuel fired generation technologies. Few power-generating technologies have as little impact as photovoltaic solar panels during operation.

However, as with all energy sources, there are potential health and safety hazards associated with the full product life cycle of photovoltaics. The lifecycle impacts of photovoltaics include raw material production, manufacture, use and disposal. While some potentially hazardous materials are utilized in the life cycle of photovoltaic systems, none present a risk different or greater than the risks found routinely in modern society.

The most significant health and safety hazards are associated with the use of hazardous chemicals in the **manufacturing phase** of the solar cell. The solar cells are however not to be manufactured on site. A potentially harmful by-product associated with the mining and processing of silica sand is crystalline silica dust. Silica dust has been associated with silicosis, a lung disease where scar tissue forms in the lungs and reduces the ability to breath. Many different potentially hazardous chemicals are used during the production of solar cells. The primary health and safety concerns are exposure to and inhalation of kerf dust, a buy-product of sawing the silicon ingots into wafers, and exposure to solvents, such as nitric acid, sodium hydroxide and hydrofluoric acid, used in wafer etching and cleaning as well as reactor cleaning. Many of these solvents also pose a risk of chemical burns.

Improper disposal of solar panels at the end of their useful life also presents a health and safety concern. However, the intent of Eskom is to recycle the solar panels for re-use as new panels. Note however, that in the event of a fire, it is theoretically possible for hazardous fumes to be released and inhalation of these fumes could pose a risk to human health. However, these risks are not substantial given the short-duration of fires and the relatively high melting point of the materials present in the

solar modules. Moreover, the risk of fire at ground-mounted solar installations is remote because of the precautions taken during site preparation including the removal of fuels and the lack of burnable materials – mostly glass and aluminium – contained in a solar panel. A greater potential risk associated with photovoltaic systems and fire is the potential for shock or electrocution if a fire-fighter or emergency responder comes in contact with a high voltage conductor. Nonetheless, uncontrolled veld fires are a concern in the Mpumalanga Province, especially in the dry winter season, which poses a potential hazard which needs to be noted.

In short, the health and safety concerns for the life-cycle phase are minimal and limited to rare and infrequent events. With effective regulation, enforcement, and vigilance by operators (and manufacturers), any danger to workers and the public can be neutralised.

Table 4-11: Summary of impact of health, safety and security - operation phase

PHASE: OPERATION PHASE		
NATURE: Health, safety, and security		
CAN IMPACTS BE MITIGATED	YES	
IMPACT ASSESSMENT	**WITHOUT MITIGATION**	**WITH MITIGATION**
MAGNITUDE	MINOR	NEGLIGIBLE
DURATION	LONG-TERM	LONG-TERM
EXTENT	LOCAL	LOCAL
PROBABILITY	LOW	NEGLIGIBLE
SIGNIFICANCE	LOW (16)	NONE
STATUS	NEGATIVE	NEUTRAL
ENHANCEMENT MEASURES: • Safety at and around the site should be ensured by limiting any fire risks, fencing off the site to avoid unauthorised access and employing security personnel • No unauthorised entry to the site is to be allowed; access control and a method of identification of maintenance personnel are required at all times • The security must ensure that open fires on the site for heating, smoking or cooking are only allowed in designated areas • The security must be provided with adequate firefighting equipment on site and be provided with firefighting training. • Establish a code of conduct to increase public safety for the site and surrounds • Employ the services of a health and safety expert to investigate the potential from fire from activities at the Rietkuil raceway in relation to potential onset of fire.		
CUMULATIVE IMPACTS: Not applicable no other known developments in the area.		
RESIDUAL IMPACTS: Full product lifecycle of PV.		
ASSESSMENT OF NO-GO OPTION: No negative impact as the status quo remains.		

The **impact assessment** during the operation phase is assessed to be minor in intensity without mitigation; long-term in duration; local in extent; and a low probability without mitigation. The impact is assessed to be of a low negative significance to the decision making process without enhancement and neutral with enhancement.

If properly mitigated, with regards to **site alternatives** there is no difference in impact between site 1 and 3 in regards to health, safety and security and this impact is assessed as being neutral with enhancement. However, if proper mitigation is not undertaken, site 1 potentially offers more negative impact, due to being closer to Arnot and Rietkuil residents and the power station facilities. Site 3 however also poses a potential health and safety risk, if precautions are not undertaken as proposed, since north of site 3 is the Rietkuil raceway which hosts monthly championships. In the event of a crash at the raceway the potential exists for fire which could lead to an onset of fire of site 3 PV facilities with potentially dangerous consequences as described above. In this regard, the continuity of these raceway events might need to be considered by health and safety experts and should this pose a potential threat, these activities need to possibly be halted.

4.5 NUISANCE, NOISE, AND OTHER DISRUPTIONS AND CHANGE IN QUALITY OF LIVING ENVIRONMENT

Social impacts experienced in the physical environment relate to exposure to dust, noise, odour, vibration, artificial light etc. The impacts related to the quality of the living environment refer to how appropriate, from a social point of view, the study area is to live in. These impacts relate directly to the biophysical environment and are assessed according to both a perceived and actual dimension. This impact is essentially relevant to the construction phase. Visual impacts on the physical environment are addressed separately in the impact that follows.

Impacts associated with construction related activities include noise, dust and disruption to adjacent properties. Noise in this regard can be described as any loud, unpleasant or disagreeable sounds that occur as a result of demolishing activities, transport and movement and construction. These noises can be of great irritation to those residing close to the proposed site.

Site clearing for Solar Energy facilities increase the risk of dust being generated, which can in turn impact on adjacent properties. The potential impacts can be addressed by implementing effective mitigation measures.

The movement of heavy construction vehicles during construction phase also has the potential to create noise, damage to roads and dust. The primary sources of noise during construction would be from the construction equipment and vehicles. Generation of dust would come from construction activities. Short-term increases in the use of local roads would occur during the construction period. However heavy equipment would most likely remain at the site for the construction period.

Some change in quality of living environment for the nearby farm worker residents, residents from Rietkuil and Arnot residents could be expected from the disruptions. Impacts from these nuisances could impact on project workforce as well as surrounding farms, landowners, and the Olifantsrivier church community.

In terms of noise impact, the National Noise Regulations define an increase of 7 dB as disturbing. It is therefore advised that noise levels be kept within 7 dB of the baseline data. Noise reduction is essential and contractors must endeavour to limit unnecessary noise, especially loud talking, shouting, whistling, radios, sirens, hooters of vehicle revving, etc.

As such, during the **construction phase**, it is expected that there will be a decrease in the quality of the physical environment, albeit of a low magnitude. Noise levels, traffic volumes, dust, etc will increase as result of the construction activities.

Table 4-12: Summary of impact of nuisance, noise, disruptions – construction phase

PHASE: CONSTRUCTION PHASE		
NATURE: Nuisance, noise, disruptions, dust and change in quality of living environment		
CAN IMPACTS BE MITIGATED	YES	
IMPACT ASSESSMENT	**WITHOUT MITIGATION**	**WITH MITIGATION**
MAGNITUDE	LOW	MINOR
DURATION	SHORT-TERM	SHORT-TERM
EXTENT	LOCAL	LOCAL
PROBABILITY	HIGHLY PROBABLE	MEDIUM PROBABILITY
SIGNIFICANCE	LOW (24)	LOW (18)
STATUS	NEGATIVE	NEGATIVE
ENHANCEMENT MEASURES: • Dust suppression measures must be implemented when (and if) required • Residents from Arnot hostels and Reitkuil in close proximity to the development site should be notified 24 hours prior to any planned activities that will be unusually noisy. • The existing stakeholders forum should be utilised discuss traffic, dust, noise and other construction related concerns • Construction related activities should be limited to work days (Monday to Friday daylight hours) and the impact on traffic patterns should be mitigated by instating traffic off-peak times • Adequate monitoring of the biophysical impacts should occur in order to address any unnecessary inconveniences to stakeholders • Plant tall trees as barriers in public spaces to reduce visual and light intrusion, as well as noise impacts		
CUMULATIVE IMPACTS: None		
RESIDUAL IMPACTS: None		
ASSESSMENT OF NO-GO OPTION: No negative impact as the status quo remains.		

The **impact assessment** during the construction phase is assessed to be low in intensity without mitigation; short-term in duration; local in extent; and a highly probable without mitigation. The impact is assessed to be of a medium negative significance to the decision making process without enhancement and low negative with enhancement.

With regards to **site alternatives**, site 1 has the potential to provide greater negative impact on noise, nuisance, and disruptions than compared to site 3, due to being located closer to nearby residents.

4.6 VISUAL LAND USE PATTERNS ALTERATION AND CHANGE IN SENSE OF PLACE AND OTHER SPATIAL CONSIDERATIONS

The sense of place is developed over time as the surrounding community embraces the surrounding environment, becomes familiar with its physical properties, and creates its own history. The sense of place is created through the interaction of various characteristics of the environment, including atmosphere, visual resources, aesthetics, climate, lifestyle, culture and heritage. Importantly though it is a subjective matter and is dependent on the demographics of the population that resides and works in the area and their perceptions regarding trade-offs.

An impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light. The social impacts associated with the impact on sense of place relate to the change in and visual impact of the proposed Solar Energy Power Plant. Note however that the project is located next to an operational large coal-fired power station. This activity dominates the landscape and sense of place.

This impact is essentially relevant to the following phases:

- Construction phase
- Operational phase
- Decommissioning phase

4.6.1 VISUAL AND LAND USE PATTERNS ALTERATION AND CHANGE IN SENSE OF PLACE AND OTHER SPATIAL CONSIDERATIONS – CONSTRUCTION

The construction activities will cause noise and disruptions from vehicles and machinery. These activities will alter the existing land use patterns on the site from currently vacant no use to construction related activities which have a visual impact, but will be overshadowed by the adjacent power station activities.

As is customary with any new development, conversion and diversification of land use will occur with visual effects. This refers to the change in the way land is used, both in terms of the area of land appropriated for a particular activity, the intensity of the use of the land and whether there are areas of land not used for production, and in terms of the type of land use activities and the pattern or mix of those activities.

The **construction phase** will see a total transformation from the current setting and landscape of the proposed sites. It is inevitable that the visual impact during the construction phase will be affected by dust, peak of 50 vehicles, etc. Potential visual impacts caused by construction activities will include the visual changes brought about by clearance of vegetation for solar field, ancillary buildings and laydown areas; visual disturbance caused by construction of roads, buildings, energy collectors, power lines, increased traffic (and number of large vehicles), worker presence and activity, and dust emissions. Other visual disturbances may include soil stockpiles (from excavation for building foundations and other structures), soil scars, as well as potential for invasive plant species to develop on disturbed soils and soil stockpiles, which may contrast with existing vegetation, etc.

Table 4-13: Summary of impact of visual and land use patterns alteration – construction phase

PHASE: CONSTRUCTION PHASE		
NATURE: Impact of visual and land use patterns alteration		
CAN IMPACTS BE MITIGATED	YES	
IMPACT ASSESSMENT	**WITHOUT MITIGATION**	**WITH MITIGATION**
MAGNITUDE	LOW	MINOR
DURATION	SHORT-TERM	SHORT-TERM
EXTENT	LOCAL	LOCAL
PROBABILITY	HIGHLY PROBABLE	MEDIUM PROBABILITY
SIGNIFICANCE	MEDIUM (32)	LOW (18)
STATUS	NEGATIVE	NEGATIVE
ENHANCEMENT MEASURES: • Dust suppression measures must be implemented when required • Residents in close proximity to the development site should be notified 24 hours prior to any planned activities that will be visible. • The existing forum with adjacent landowners should be used to serve as liaison between the affected stakeholders and the developer and to discuss traffic, dust, noise and other construction related concerns • Plant tall trees as barriers in the regions where such trees do not exist to reduce visual intrusion. In this regard consider planting tall trees as barriers along the southern boundary of site 1 to reduce impacts to adjacent properties similar to the avenue of trees to the south of site 3. A barrier of trees (or other) could also be considered as screens to the eastern portion of the northern half of site 1 to screen impact to the hostel dwellers. • Little measures exist to control the visual impact caused by the construction activities, although measures can be put in place to ensure that construction yards where building material is stored and temporary worker's houses and site offices are located cause minimum visual distraction. • Project developers should demarcate construction boundaries and minimise areas of surface disturbance. • Construction of new roads should be minimised and existing roads should be used where possible. • Night lighting of the construction sites should be minimised within requirements of safety and efficiency.		
CUMULATIVE IMPACTS: N.a.		
RESIDUAL IMPACTS: Reduced visual quality of area.		
ASSESSMENT OF NO-GO OPTION: No negative impact as the status quo remains.		

The **impact assessment** during the construction phase is assessed to be low in intensity without mitigation; short-term in duration; local in extent; and a highly probable without mitigation. The impact is assessed to be of a medium negative significance to the decision making process without enhancement and low negative with enhancement.

With regards to **site alternatives**, site 1 has the potential of causing greater visual impact than compared to site 3, due to being located close to nearby residents of Arnot hostel dwellers.

4.6.2 VISUAL AND LAND USE PATTERNS ALTERATION AND CHANGE IN SENSE OF PLACE AND OTHER SPATIAL CONSIDERATIONS – OPERATIONS

There are a number of components of the proposed facility that will potentially cause visual intrusion on views of sensitive visual receptors in the area during the 25 year operational lifetime of the facility. The solar panels will likely be the most significant of these as the area they will cover is large, approximately between 14 to 25 Ha for Site 3 and 1 respectively. Note that the PV panels to be utilised are designed to transmit light, not reflect it and are designed with tempered glass to have low reflectivity. Nonetheless, the glint from the PV panels are equivalent to still water in a lake or dam. There are none of these features in the view shed which causes glint. The solar field is large, albeit that it is located right next to the Arnot Power Station. The operational large coal-fired power station dominates the landscape and sense of place in this area.

Nonetheless, the contrast between the solar field and surrounding vegetation will exist, in colour, form, line and texture. Existing vegetation will not provide much screening since it consists mostly of low bushes and shrubs, or grass.

The following sensitive viewers or viewpoints will be exposed to the solar energy facility:

- Residents from Rietkuil
- Viewpoints on surrounding farms – although the surrounding farms are located to the south of the proposed sites and their views will mostly be on looking to the back of the solar panels and not be affected by glint. The majority of the adjacent properties are also screened by the boulevard of trees. Except adjacent properties to the south of site 1.
- Motorists using main roads in the region
- Visitors to the Rietkuil raceway will be directly visually impacted by the northerly glint from Site 3.
- Hostel dwellers will be directly visually impacted by the northerly glint that could be expected from the solar panels situated on site 1.

Hostel dwellers however have a greater risk of being affected visually during operation, especially if site 1 is developed. The impacts on the hostel dwellers are thus discussed in a separate impact assessment elsewhere in this report.

During operations, the expected glint will be orientated north facing from the proposed sites and fortunately residents from Rietkuil are not directly north of the proposed sites, although they are located north easterly of site 3. Rietkuil residents are thus expected to experience moderate visual intrusion from the glint. The Rietkuil residents however, are visually already located in an area that is visually impacted by surrounding structures such as the cooling towers, the slimes dams, etc. However, there are no similar structures currently in their views. The existing boulevard of trees however offer some protection from this glint and visual intrusion.

With regards to motorists and adjacent property owners to the south of site 1 and 3, visual exposure and visual intrusion exists. The PV panels will be in full view to the south of Site 1 and in this area existing vegetation does not provide much screening from the development. However motorists are more focused on the road than the surrounding landscape. Motorists thus have a lower sensitivity due to short exposure time and the fact that their focus on landscape is reduced. Furthermore, the motorists as well as the adjacent property owners are located south of the proposed sites and will

thus not be impacted by any northerly glint, albeit low. In this regard it can also be noted that a PV field in Italy was built right next to an airport. The airport were also concerned about the reflectivity of the panels. The panels were extensively tested and proven to have very little reflectivity, and the airport is unaffected by reflectivity of the panels.

However, unlike motorists, the adjacent property owners, don't have a short exposure time and their north facing properties, especially in the case of the three farm workers dwellings south of site 3, are on looking to the proposed sites, albeit to the back of the PV panels. Part of site 3 is screened through a lining of trees, although a gap exists between the farm workers dwellings and site 3.

Nonetheless, there as thus a number of components of the proposed facility that will potentially cause visual intrusion on views of sensitive visual receptors in the area during the 25 year operational lifetime of the facility. The solar panels will likely be the most significant of these as the area they will cover is large, approximately between 14 to 25 Ha depending on which site is developed.

The components associated with the proposed plant will have a visual impact and, in so doing, impact on the landscape and sense of the place of the area. However, the impact associated with solar energy is relatively low due to the relatively low height of solar PV panels and associated infrastructure and the relatively low reflectivity. Note that the visual integrity of the area has also been impacted by the existing Arnot Power station and its infrastructure. At a broader level the visual integrity of the area has been negatively impacted by the power station and its associated infrastructure.

However, solar energy development is subject to spatial or locational constraints which are more complex than just purely visual constraints. In essence, locational constraints include the presence of adequate solar radiation, adequate and cost-effective access to the electricity grid, a willing landowner along with limited agricultural, topographical and environmental constraints. If one considers all of the aforementioned constraints, it is clear that solar energy projects face a complex set of requirements that create significant spatial constraints and tend to limit solar projects to relatively small areas. With respect to the proposed sites, these are outlined below:

- **Adequate solar radiation/resources:** Solar PV projects rely on the availability of abundant solar resources. The study area is ideal for solar projects as they meet the basic requirement of essentially offering enough quality sunlight hours.
- **Grid access:** All solar projects need to connect to the Eskom electricity grid at a competitive cost. As one would expect, connecting directly to a sub-station offers significant advantages. It is significantly cheaper as it requires less gear and fewer transformers compared with the alternative of connecting into a transmission line which requires extra transformers and gear on the project site sub-station to "loop-in and loop-out" of the transmission line. In addition, connection directly to a sub-station where there is space has strategic advantages. It means that one's access to the grid is more secure compared to connecting to a transmission line where other projects could use up capacity. The majority of solar projects are located in close proximity to sub-stations. As a general rule of thumb, it is only in the best case scenarios that connecting transmission lines can exceed 5 km without leading to restrictive costs. For the proposed sites the estimated length of transmission lines is approximately a mere 2000 metres.
- **Land access:** agreements with land owner(s) are required before proceeding with solar projects, in contrast to mineral prospecting rights. In the case of the proposed project, the land is already owned by Eskom and land access is not a problem.
- **Topography and environmental site constraints:** Various environmental and topographical constraints such as avoiding drainage need to be avoided. If too many of these features are present on a site they result in its fragmentation thereby reducing efficiencies and adding to the cost of developing a project.

Table 4-14: Summary of visual and land use patterns alteration – operation

PHASE: OPERATION PHASE		
NATURE: Visual and land use patterns alteration and change in sense of place and other spatial considerations		
CAN IMPACTS BE MITIGATED	YES	
IMPACT ASSESSMENT	**WITHOUT MITIGATION**	**WITH MITIGATION**
MAGNITUDE	LOW	MINOR
DURATION	LONG-TERM	LONG-TERM
EXTENT	LOCAL	LOCAL
PROBABILITY	HIGHLY PROBABLE	MEDIUM PROBABILITY
SIGNIFICANCE	MEDIUM (40)	LOW (24)
STATUS	NEGATIVE	NEGATIVE
ENHANCEMENT MEASURES: • Additional vegetation between the site and adjacent properties should be considered where required. • Plant tall trees as barriers in the regions where such trees do not exist to reduce visual intrusion. In this regard consider planting tall trees as barriers along the southern boundary of site 1 to reduce impacts to adjacent properties similar to the avenue of trees to the south of site 3. A barrier of trees (or other) could also be considered as screens to the eastern portion of the northern half of site 1 to screen impact to the hostel dwellers. Plant some more trees as screen south of site 3 between site 3 and 3 farm dwellers accommodation.		
RESIDUAL IMPACTS: None anticipated if the visual impact will be removed after decommissioning, provided the infrastructure is removed and the site is rehabilitated to its original (current) status.		
ASSESSMENT OF NO-GO OPTION: No negative impact as the status quo remains.		

The **impact assessment** during the operation phase is assessed to be low in intensity without mitigation; long-term in duration; local in extent; and a highly probable without mitigation. The impact is assessed to be of a medium negative significance to the decision making process without enhancement and low negative with enhancement. The impact is assessed as being low in intensity as much of the impact is already screened to the large number of households from Rietkuil, but there are immediate adjacent property owners impacted visually. With mitigation suggestions, the impact is only low negative.

With regards to site alternatives, site 1 and 3 are directly adjacent other property owners and residents and motorists. However, site 3 could have north easterly glint that could impact on Rietkuil residents.

4.6.3 VISUAL AND LAND USE PATTERNS ALTERATION AND CHANGE IN SENSE OF PLACE AND OTHER SPATIAL CONSIDERATIONS – DECOMMISSIONING

There are various actions related to decommissioning of the facility that have an impact on sensitive visual receptors. Immediate visual impacts during decommissioning will be similar to those caused during construction of the facility, but of a much shorter duration. Impacts may include road redevelopment, removal of aboveground structures and equipment, movement and activities of workers, increased traffic, dust emissions and presence of dismantled equipment. Rehabilitation of the decommissioned site could entail grading, scarifying, seeding and planting. Disturbed and rehabilitated areas may take a long time to recover to pre-project conditions, and contrast between existing and newly planted vegetation may persist many seasons.

Decommissioning and removal of the solar energy plant will include all of the structures for PV and buildings and related concrete foundations. Reversibility of the visual impact is therefore moderate to high, keeping in mind that it may take several years for the vegetation to fully recover.

The location of the proposed site is however associated with scenic views or views that are highly valued by sensitive viewers for their natural beauty. The effect of decommissioning the plant could have a positive permanent improvement to the visual resources in that less negative views exist.

Table 4-15: Summary of impact of visual and land use patterns alteration – decommissioning

PHASE: DECOMMISSIONING PHASE		
NATURE: Impact of visual and land use patterns alteration		
CAN IMPACTS BE MITIGATED	YES	
IMPACT ASSESSMENT	**WITHOUT MITIGATION**	**WITH MITIGATION**
MAGNITUDE	MINOR	MINOR
DURATION	SHORT-TERM	PERMANENT
EXTENT	LOCAL	LOCAL
PROBABILITY	MEDIUM	MEDIUM
SIGNIFICANCE	LOW (18)	LOW (27)
STATUS	NEGATIVE	POSITIVE
ENHANCEMENT MEASURES: • All structures and infrastructure associated with the proposed facility should be dismantled and transported off-site on decommissioning. • Rehabilitation of the decommissioned site could entail grading, scarifying, seeding and planting.		

The **impact assessment** during the operation phase is assessed to be low in intensity without mitigation; short-term in duration; local in extent; and a medium probable without mitigation. The impact is assessed to be of a low negative significance to the decision making process without enhancement. With enhancement a permanent improvement to visual impact could results from the decrease in visual intrusion.

With regards to **site alternatives**, decommissioning of both sites will lead to improvements.

4.7 IMPACTS ON ARNOT RESIDENTS

Arnot residents are located directly east of the northern half of the proposed site 1.

The Arnot hostel and other residents are likely to be impacted, especially with regards to site 1, during the following phases:

- Construction phase
- Operation phase

4.7.1 IMPACT ON ARNOT RESIDENTS– CONSTRUCTION

Construction activities will cause noise, nuisance, dust, visual disturbance etc. which could impact the residents. The residents are located close to the proposed construction activity and construction vehicles, construction workers, and construction activities pose a threat to the safety of residents. Construction related noise and dust pollution can have an effect on activities as it could cause lack of concentration, as well as influencing quality of living environment. This impact is only temporary during the construction phase.

Table 4-16: Summary of impact on Arnot residents– construction phase

PHASE: CONSTRUCTION PHASE		
NATURE: Impact on Arnot residents		
CAN IMPACTS BE MITIGATED	YES	
IMPACT ASSESSMENT	**WITHOUT MITIGATION**	**WITH MITIGATION**
MAGNITUDE	HIGH	MODERATE
DURATION	SHORT-TERM	SHORT-TERM
EXTENT	LOCAL	LOCAL
PROBABILITY	HIGHLY PROBABLE	MEDIUM PROBABILITY
SIGNIFICANCE	MEDIUM (48)	MEDIUM (30)
STATUS	NEGATIVE	NEGATIVE
ENHANCEMENT MEASURES: • Dust and noise generation should be minimised as much as possible • Traffic calming measures should be put in place to deter any unnecessary through-traffic through the surrounding residential environs • Dust suppression measures must be implemented • Residents should be notified days in advance prior to any planned activities that will be unusually noisy • Safety at and around the construction site should be ensured by limiting any risks, fencing off the construction area to avoid unauthorised access and employing security personnel • It is specifically recommended that site 1 be accessed for construction activities through the main road to the south of the sites and not through the Arnot Power station. The construction activities at both sites also need to be fenced off so that construction workers do not wonder over to residents and or hostel dwellers at Arnot. • Working hours should be kept between 7am and 5pm		

PHASE: CONSTRUCTION PHASE
• The perimeter of the construction site should be appropriately secured to prevent any unauthorised access to the site; the fencing of the site should be maintained throughout the construction period • No unauthorised entry to the site is to be allowed; access control and a method of identification of site personnel are required at all times • Security lighting should be implemented
ASSESSMENT OF NO-GO OPTION: No negative impact as the status quo remains.

The **impact assessment** during the construction phase is assessed to be high in intensity without mitigation; short-term in duration; local in extent; and highly probable without mitigation. The impact is assessed to be of a medium negative significance to the decision making process with and without enhancement.

With regards to **site alternatives**, developing site 1 provides greater negative impact to Arnot residents as the site is directly adjacent to Arnot residents, than compared to site 3 which is located further away from residents.

4.7.2 IMPACT ON ARNOT RESIDENTS– OPERATION

During operation of the proposed site, approximately between 14ha and 26 ha of property will be occupied by the solar energy facility infrastructure, depending on the site chosen.

The Arnot residents are located immediately north east of site 1 and will potentially be impacted by the glint, from the solar panels which would need mitigation in order for activities not to be disturbed.

The visual quality of the area has however already been altered by the existing power plant and related infrastructure. Nonetheless, visual exposure and visual intrusion exists for these residents. The PV panel arrays will be in full view and existing vegetation does not provide much screening for the development. There are a number of components of the proposed facility that will potentially cause visual intrusion on views of sensitive visual receptors in the area during the 25 year operational lifetime of the facility. The solar panels will likely be the most significant of these as the area they will cover is large.

The components associated with the proposed plant will have a visual impact on residents, in so doing, impact on the landscape and sense of the place of the area. Aesthetic perceptions are a key determinant of people's attitudes, and these perceptions are subjective, deeply felt and diametrically contrasting. Landscapes are often an important part of people's sense of place.

A specialist visual assessment of the proposed development is not included in the social impact assessment, although it seems most reasonable to conclude that the development would not be without visual risks to the residents from Arnot. Arriving at an assessment of the overall risk to residents needs to be recognised as an exercise with high levels of uncertainty given the lack of experience with solar energy projects in South Africa. Nevertheless, considered as a whole, the key potential drivers of negative impacts during operation primarily from visual seem to imply a low level of risk with proper mitigation.

With regards to health impacts, the generation of electricity from photovoltaic (PV) solar panels is safe and effective. Because PV systems do not burn fossil fuels they do not produce the toxic air or greenhouse gas emissions associated with conventional fossil fuel fired generation technologies. Few power-generating technologies have as little impact as photovoltaic solar panels during operation. However, in the event of a fire, it is theoretically possible for hazardous fumes to be released and inhalation of these fumes could pose a risk to human health. This is a concern given the relative closeness to Arnot residents.

Table 4-17: Summary of impact on Arnot residents– operation phase

PHASE: OPERATION PHASE		
NATURE: Impact on Arnot residents		
CAN IMPACTS BE MITIGATED	YES	
IMPACT ASSESSMENT	**WITHOUT MITIGATION**	**WITH MITIGATION**
MAGNITUDE	MODERATE	LOW
DURATION	LONG-TERM	LONG-TERM
EXTENT	LOCAL	LOCAL
PROBABILITY	HIGHLY	LOW
SIGNIFICANCE	MEDIUM (48)	LOW (20)
STATUS	NEGATIVE	NEGATIVE
ENHANCEMENT MEASURES: • PV panels should be located as such to ensure that visual impacts are minimised without compromising efficiency • A wall (or buffer of natural vegetation) should be built (or maintained) along the sides of the Arnot residencies to assist with screening the PV panels • The lowest possible height for the PV panels, without compromising efficiency, is suggested so that the visual intrusion is lessened. • Safety at and around the site should be ensured by limiting any fire risks, fencing off the site to avoid unauthorised access and employing security personnel • No unauthorised entry to the site is to be allowed; access control and a method of identification of maintenance personnel are required at all times • The security must ensure that open fires on the site for heating, smoking or cooking are only allowed in designated areas • The security must be provided with adequate firefighting equipment on site and be provided with firefighting training. • Establish a code of conduct to increase residents safety for the site and surrounds		
ASSESSMENT OF NO-GO OPTION: No negative impact in relation to the status quo.		
CUMULATIVE: Not applicable.		
ASSESSMENT OF NO-GO OPTION: No negative impact as the status quo remains.		

The **impact assessment** during the operation phase is assessed to be moderate in intensity without mitigation; long-term in duration; local in extent; and a highly probable without mitigation. The impact is assessed to be of a medium negative significance to the decision making process without

enhancement and with enhancement could be low negative significance. The key mitigation required is to screen the effect of the glare to residents.

With regards to **site alternatives** site 1 provide greater negative impact to Arnot residents than compared with Site 3.

4.8 IMPACTS ON AGRICULTURE

Directly adjacent to the south of Site 3, as well as in the general surroundings there is crop farming. The area surrounding the proposed sites have also been noted in the SDF of Steve Tshwete (2010) as an area that has conflicting land use in that the area has numerous mining and energy production uses but also some of the highest agricultural potential, comprising of arable land under irrigation, mostly comprised of maize farming.

Statistics South Africa provides the following information regarding type of specific agricultural activities in Steve Tshwete Local Municipality (www.beta2.statssa.gov.za):

- **TYPE OF PRODUCTION** (a household could engage in more than one type):
- Livestock production: 2 065 households
- Poultry production: 2 395 households
- Vegetable production: 1 831 households
- Production of other crops: 757 households
- **TYPE OF ACTIVITIES:**
- Crops only: 1 477 households
- Animals only: 2 875 households
- Mixed farming: 811 households
- Other: 861 households
- **ANNUAL INCOME OF AGRICULTURAL HOUSEHOLDS HEADS:**
- No income: 1 129 households
- R1- R4800: 179 households
- R 4801 – R38 400: 2 369 households
- R38 401 – R307 200: 1 780 households
- R307 201+: 333 households

Evidently, slightly more than 6,000 households are involved in agriculture of which less than 6% of households involved in agriculture in Steve Tshwete Local municipality that do so on large scale earning more than approximately R300,000 per annum from agriculture.

Vegetable production, crop production mostly in the form of mielies, livestock production mostly in the form of cattle, and poultry production are some of the key activities for household involved in agriculture in Steve Tshwete Local Municipality.

The agriculture sector is likely to be impacted during the following phases:

- Construction phase
- Operation phase
- Decommissioning phase

4.8.1 IMPACT ON AGRICULTURE– CONSTRUCTION

Construction activities will cause noise, nuisance, dust, visual disturbance etc which could potentially impact the agricultural sector. The poultry industry is specifically susceptible to noise, vibration, dust.

There however doesn't appear to be any poultry infrastructure within a 5km radius from the proposed sites. The farming households and their livestock will also be affected visually by the construction activities. The impact on farming from the construction activities are however more related to nuisance and are not expected to post a large constraint on farming activities.

Table 4-18: Summary of impact on agriculture– construction phase

PHASE: CONSTRUCTION PHASE		
NATURE: Impact on agriculture: mealies, cattle, poultry		
CAN IMPACTS BE MITIGATED	YES	
IMPACT ASSESSMENT	**WITHOUT MITIGATION**	**WITH MITIGATION**
MAGNITUDE	MINOR	MINOR
DURATION	SHORT-TERM	SHORT-TERM
EXTENT	LOCAL	LOCAL
PROBABILITY	MEDIUM PROBABLE	LOW PROBABILITY
SIGNIFICANCE	LOW (18)	LOW (12)
STATUS	NEGATIVE	NEGATIVE
ENHANCEMENT MEASURES: • Surrounding farmers should be notified prior to planned within visible/audible range • Dust and noise generation should be minimised as much as possible		
ASSESSMENT OF NO-GO OPTION: No negative impact as the status quo remains.		

The **impact assessment** during the construction phase is assessed to be minor in intensity without mitigation; short-term in duration; local in extent; and a medium probable without mitigation. The impact is assessed to be of a low negative significance to the decision making process without enhancement and low negative with enhancement.

With regards to **site alternatives,** site 3 is directly adjacent to farming activity and is likely to cause the greatest nuisance during construction.

4.8.2 IMPACT ON AGRICULTURE– OPERATION

Occupation of land by solar energy facility infrastructure, to the approximately size of 14.4 ha or 25.8 ha (depending on site alternative 3 or 1) in size has the effect of impacting the actual footprint of the site. Thus the activities associated with the operation phase could have resulted in a loss of potential farmland available for potential agricultural production for the operation period of 25 years. However, since the property is owned and operated by Eskom, the use of the land for farmland would never have been an option and Eskom has no intent of using the property for any form of agriculture.

Drawing on experience from other solar farms, with regards to surrounding farm land, crop farmers are likely to have many contrasting elements in their views including various crops, buildings, power lines and irrigation equipment and the quality of their views are therefore likely to be lower than that of stock farm residents. Surrounding cattle farms could have a moderate sensitivity to the project while irrigated lands could have a low sensitivity given similarities between the patterns and straight lines that characterise cropped areas and solar panel arrays.

A solar energy facility will not look out of place in this landscape as the landscape is already disturbed with other visual intrusions. Furthermore the visual intrusion from the low reflective rays of the solar panels, albeit indicated as being very low, will be in a northerly direction. Farms to the north of the proposed sites could thus potentially be affected more.

The effects on the farmland would however not represent a loss in production and would not lead to a reduction in the farm's permanent workforce. Note also that wind and solar energy farms are often created on portions of farmers land while the remaining land not affected by the footprint continues with farming production.

No negative impacts are anticipated on the surrounding agricultural activities given the passive and non-polluting nature of the project. All agricultural production and activities will be able to continue as at present. Any surrounding farmland that is specifically aimed at game farming (not readily existing in this area) or tourism accommodation facilities could be impacted based on tourisms perception of the visual impact as discussed elsewhere.

Visually, the proposed facility is not likely to change the overall agricultural landscape character of the area and most views of the site also include large scale man-made structures from the Arnot power station. Farms directly to the north of the proposed sites would be affected more, although directly north of the proposed sites there is mostly either the Power Station infrastructure, Arnot residents, and Rietkuil residents. Surrounding farm residents that are south of the proposed sites would potentially have a low negative significant impact for the duration of the operation phase although their impacts can be mitigated with screening. There are some individual farm houses to the south of site 3 that are not screened by an avenue of trees. Nonetheless, the facility would essentially be within the landscape character of the area, but given its large size (between 14.4 Ha and 25.8 Ha), it would introduce visual risks for adjacent neighbours. When considering the potential for blending into the character of the wider area, and with mitigation, it is anticipated that risks to views and amenity values on neighbouring farms would be low with mitigation. As a consequence of the prediction of minimal negative impacts, it is deemed unlikely that there would be negative impacts on the value of properties surrounding the site.

Table 4-19: Summary of impact on agriculture– operation phase

PHASE: OPERATION PHASE		
NATURE: Impact on agriculture: mielies, cattle, poultry		
CAN IMPACTS BE MITIGATED	YES	
IMPACT ASSESSMENT	**WITHOUT MITIGATION**	**WITH MITIGATION**
MAGNITUDE	NEGLIGIBLE	NEGLIGIBLE
DURATION	LONG-TERM	LONG-TERM
EXTENT	LOCAL	LOCAL
PROBABILITY	MEDIUM	LOW
SIGNIFICANCE	LOW (18)	LOW (12)
STATUS	NEUTRAL	NEUTRAL
ENHANCEMENT MEASURES: • PV panels should be located as such to ensure that visual impacts are minimised without compromising efficiency • A buffer of natural vegetation should be maintained along the south of proposed site 1 and site 3 to assist with screening the PV panels		

PHASE: OPERATION PHASE
• The lowest possible height, without compromising efficiency, is suggested so that the visual intrusion is lessened.
ASSESSMENT OF NO-GO OPTION: No negative impact in relation to the status quo.
CUMULATIVE: The overall loss of agricultural land in the region due to other developments is minimal as no other developments are currently known about. Cumulative impacts on agriculture also require consideration particularly if significant amounts of medium to high potential agricultural land would be lost. In this case, land owned by Eskom is being utilised. For any other projects proposed it is assumed that high potential agricultural land would not be used.
ASSESSMENT OF NO-GO OPTION: No negative impact as the status quo remains.

The **impact assessment** during the operation phase is assessed to be negligible in intensity without mitigation; long-term in duration; local in extent; and a medium probability without mitigation. The impact is assessed to be of a low neutral significance to the decision making process with and without enhancement.

With regards to **site alternatives**, site 3 that is directly adjacent to existing farmland has a greater impact, albeit low, than site 1 on surrounding farmland.

4.8.3 IMPACT ON AGRICULTURE– DECOMMISSIONING

The short-term actions related to decommissioning could be negative to surrounding farmers which could be similar to construction of the facility, but of a much shorter duration. Impacts may include removal of structures and equipment, movement and activities of workers, increased traffic, dust emissions and presence of dismantled equipment, etc. With appropriate mitigation, decommissioning would essentially result in the removal of risks to surrounding agricultural land owners with adequate rehabilitation of the site resulting in an impact with a low positive significance.

Table 4-20: Summary of impact on agriculture - decommissioning

PHASE: DECOMMISSIONING PHASE		
NATURE: Impact on agriculture		
CAN IMPACTS BE MITIGATED	YES	
IMPACT ASSESSMENT	**WITHOUT MITIGATION**	**WITH MITIGATION**
MAGNITUDE	MINOR	MINOR
DURATION	SHORT-TERM	PERMANENT
EXTENT	LOCAL	LOCAL
PROBABILITY	MEDIUM	MEDIUM
SIGNIFICANCE	LOW (18)	LOW (27)
STATUS	NEGATIVE	POSITIVE
ENHANCEMENT MEASURES: • All structures and infrastructure associated with the proposed facility should be dismantled and transported off-site on decommissioning.		

PHASE: DECOMMISSIONING PHASE
• Rehabilitation of the decommissioned site could entail grading, scarifying, topsoil placement, seeding and/or planting.
CUMULATIVE IMPACTS: Not applicable
RESIDUAL IMPACTS: None anticipated.
ASSESSMENT OF NO-GO OPTION: No negative impact as the status quo remains.

The **impact assessment** during the decommissioning phase is assessed to be minor in intensity without mitigation; short-term in duration; local in extent; and a medium probable without mitigation. The impact is assessed to be of a low negative significance to the decision making process without enhancement and low positive with enhancement.

With regards to site alternatives, agriculture surrounding site 3 is slightly more affected, which is why decommissioning of site 3 with appropriate mitigation will offer a slightly greater improvement to improvements in agricultural impact from visual intrusion caused by operations than compared to site 1.

4.9 DEVELOPMENT OF CLEAN RENEWABLE ENERGY

South Africa and Eskom are under immense pressure nationally and internationally due to their carbon footprint. South Africa's carbon emissions are higher than those of most developed countries partly because of the energy-intensive sectors which rely heavily on low quality coal. Use of low quality coals is the main contributor of GHG emission. The energy-intensive sectors of the economy emit carbon emissions that are higher than those of most developed economies.

The use of solar radiation for power generation is considered a non-consumptive use of a natural resource which produces zero greenhouse gas emissions. The advancement of renewable energy is a priority for South Africa. The government considers the use of renewable energy as a contribution to sustainable development. The benefits of photovoltaic's tend to far outweigh risks especially when compared to conventional fossil fuel technologies. Photovoltaics generate significantly fewer harmful air emissions per kilowatthour (KWh) than conventional fossil fuel fired technologies. Furthermore, renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future.

The support for renewable energy policy is guided by a rationale that South Africa has a very attractive range of renewable resources, particularly solar and wind and that renewable applications are in fact the least cost energy service and mostly also better when social and environmental costs are taken into account.

South Africa relies heavily on non-renewable fossils fuels (primarily coal) for energy generation purposes. This reliance remains a key feature of the current energy mix with approximately 90% of electricity generation met by non-renewables.

National and International pressure regarding global warming and environmental impacts associated with 'dirty' fuels and energy security have elevated renewable energy solutions to a far more prominent position both within energy policy and in the economic development arena.

Nationally, the country is currently facing considerable constraints in the availability and stability of electricity supply. This is a consequence of South Africa's electricity generation and supply system

being overstretched. The project therefore as the potential to contribute to greater energy supply stability, and higher levels of energy security which will benefit electricity consumers. Even though the use is not for general consumers, but for the operations of Eskom, the impact needs to be seen as replacing energy from non-renewable sources which will essentially free up more energy for consumers.

Depending on the site, between 9.6Mw (site 3) and 17.2Mw (site 1) of energy could be produced during operation. The overall contribution to South Africa's total energy requirements of the proposed Solar Energy Facility is relatively very small. However, cumulatively the more solar energy facilities exist the more use of renewable energy sources is created and this could help to offset the total carbon emissions associated with energy generation in South Africa.

The proposed project will thus provide additional generation capacity for Eskom in the local area whilst meeting national renewable energy and climate change targets.

Growth in the solar energy sector in the area could also introduce skills and development into the area. The development of a Solar Energy Facility could therefore add to the stability of the economy, and even though this Project is small scale in comparison to the overall potential of the sector, it could contribute to the local economy.

Given South Africa's reliance on Eskom as a power utility, and on Eskom non-renewable energy sources, the benefits associated with Eskom also producing renewable energy is regarded as an important contribution.

Table 4-21: Summary of impact on development of clean renewable energy– operation phase

PHASE: OPERATION PHASE		
NATURE: Impact on development of clean renewable energy		
CAN IMPACTS BE MITIGATED	NO	
IMPACT ASSESSMENT	**WITHOUT MITIGATION**	**WITH MITIGATION**
MAGNITUDE	MODERATE	N.A
DURATION	LONG-TERM	N.A
EXTENT	INTERNATIONAL	N.A
PROBABILITY	HIGHLY PROBABLE	N.A
SIGNIFICANCE	MEDIUM (60)	N.A
STATUS	POSITIVE	N.A
ENHANCEMENT MEASURES: None		
ASSESSMENT OF NO-GO OPTION: The No-Development option would represent a lost opportunity for South Africa to supplement is current energy needs with clean, renewable energy. This would represent a negative opportunity cost.		
CUMULATIVE: Reduce carbon emissions through the use of renewable energy and contribute to reducing global warming		
ASSESSMENT OF NO-GO OPTION: No negative impact as the status quo remains.		

The **impact assessment** during the operation phase is assessed to be moderate in intensity with mitigation not being possible, long-term in duration; international in extent; and a highly probable. The impact is assessed to be of a medium positive significance to the decision making process without enhancement.

With regards to **site alternatives** site 3 is planned to produce the most energy (17.2 Mw) and is considered to provide a greater positive impact than compared to site 1.

5. SOCIAL MANAGEMENT PLAN

The purpose of this section is to detail on the management plans for the actions to be implemented, relevant phase/timing, role players involved, etc. for each impact identified in the previous section, that can be ameliorated.

5.1 MAXIMISE NEW BUSINESS SALES, MULTIPLIER EFFECTS & ECONOMIC STIMULATION

The management plan for new business sales, multiplier effects and economic stimulation is only relevant to construction phase.

During the construction phase the following management aspects apply:

- **Objective**: Maximise new business sales, local economic multiplier effect, and economic stimulation during the construction phase
- **Project component/s**: Construction of the solar energy facility and associated infrastructure
- **Potential impact/s:** Potential local economic benefits
- **Risk/activity source:** Developer/contractors procurement plan
- **Enhancement target/s:** Increase the procurement of local goods and services
- **Performance indicator/s:**
    - Local procurement policy is adopted
    - Local goods and services are purchased from local suppliers where available and feasible
- **Monitoring**: The developer/contractor must monitor indicators listed above to ensure that they have been met for the construction phase

The enhancement actions as well as the phasing and relevant role player for each action, in order to achieve the above, are tabled hereunder.

Table 5-1: Summary of actions, phase and responsible role players for maximising new business sales, local economic multiplier effect, and economic stimulation during the construction phase

ACTION	PHASE	ROLE PLAYERS
Adopt a local procurement policy to maximise the benefit to the local economy	• Pre-construction • Construction	• Eskom • Contractor/s
Develop a database of local companies, specifically BBBEE companies, which qualify as potential service providers prior to the commencement of the tender process for construction contractors. These companies should be notified of tender and invited to bid.	• Pre-construction • Construction	• Eskom • Municipality • Business organisations • Contractors
Investigate the possibility of procurement of construction materials, goods and products from local suppliers where available/feasible, in order to source as much good and services as possible from the local area.	• Pre-construction • Construction	• Eskom • Municipality • Business organisations • Local suppliers • Contractors
Identify strategies aimed at maximising the potential benefits associated with the project.	• Pre-construction • Construction	• Eskom • Local Municipality • Local Chamber of business

ACTION	PHASE	ROLE PLAYERS
		• Contractor/s
Motivate employees to spend earned income locally through ensuring that goods and services required by employees are provided locally (if possible), so that they limit expenditure elsewhere.	• Pre-construction • Construction	• Local shop owners • Employees

5.2 MAXIMISE EMPLOYMENT AND SKILLS TRANSFER

During the construction phase the following management aspects apply:

- **Objective**: Maximise local employment and skills transfer associated with construction
- **Project component/s**: Construction of the solar energy facility and associated infrastructure
- **Potential impact/s:** Local employment and skills transfer benefits
- **Risk/activity source:**
  - Contractors construction procurement practice
  - Eskom's development/investment plan
  - The employment of outside contractors who make use of their own labour will reduce the employment and business opportunities for locals.
- **Enhancement target/s:**
  - Eskom should aim to employ as many unskilled, low-skilled and semi-skilled workers from the local area as possible so that labour intensiveness is maximised. Aim to employ a minimum of 75% of unskilled or low-skilled workers from the local area (if possible). This should be a requirement for all contractors and sub-contractors.
  - Opportunities for training of workers should be maximised.
- **Performance indicator/s:**
  - Database of potential local BBBEE services providers in place before construction phase commences.
  - Employment 'locals first' policy with targets to be completed before construction commences
  - Share of semi and unskilled labour locally sourced for labour intensive work with proof that labourers have lived in the area for five years or longer
  - Skills audit to determine need for training and skills development programme undertaken within 1 month of commencement of construction phase.
- **Monitoring**:
  - The contractor must keep a record of local (and non-local) recruitment and local labour-intensive work days which needs to be reported to Eskom
  - The contractor must keep a record of worker training days
  - Monitor other indictors listed above

The enhancement actions as well as the phasing and relevant role player for each action, in order to achieve the above, are tabled hereunder.

Table 5-2: Summary of actions, phase and responsible role players for maximising local employment and skills transfer during the construction phase

ACTION	PHASE	ROLE PLAYERS
Adopt a local employment policy to maximise the opportunities made available to the local labour force	• Pre-construction • Construction	• Eskom • Contractors
Set realistic local recruitment targets for the construction phase.	• Pre-construction • Construction	• Eskom

ACTION	PHASE	ROLE PLAYERS
Apply effective labour-based construction methods in order to increase the job creation effects and where practically possible follow the principles of the Expanded Public Works Programme.	• Pre-construction • Construction	• Eskom • Contractors • Department of Local Government • Municipality
Communicate local employment opportunities in a fair and transparent manner	• Pre-construction • Construction	• Eskom • Contractors

5.3 MINIMISE IN-MIGRATION AND EFFECT OF TEMPORARY WORKERS ON SOCIAL DYNAMICS AND PRESSURE ON SOCIO-ECONOMIC INFRASTRUCTURE AND SERVICES

Given low employment during operations, the management plan for in-migration and effect of temporary workers on social dynamics is only relevant during the construction phase, which is temporary and estimated to last approximately 12 months.

During the construction phase the following management aspects apply:

- **Objective:** Avoid or reduce the potential pressure on socio-economic infrastructure/services and potential social conflicts on family structures and social networks associated with the presence of in migration of temporary non-local workforce during the construction phase
- **Project component/s**: construction of solar energy facility and associated infrastructure
- **Potential impact/s:** The presence of non-local construction workers housed locally for the duration of the construction phase can impact on local socio-economic infrastructure and services and cause a rise in social conflicts and impact on family structures and social networks.
- **Risk/activity source:** In migration of temporary workforce and job seekers in small communities
- **Enhancement target/s:**
  - To maximise use of local workforce
  - To avoid/minimise the potential increased pressure on local infrastructure and services
  - To avoid/minimise the potential impact on communities social dynamics
  - Aim for 75% of unskilled and low-skilled workforce to be sourced from the local area
- **Performance indicator/s:**
  - Share of local workers employed in construction with proof that local labourers have lived in the area for five years or longer
  - Decrease in-migration from 'outsiders'
- **Monitoring**:
  - The contractor must keep a record of local (and non-local) recruitment which needs to be reported to Eskom

The enhancement actions as well as the phasing and relevant role player for each action, in order to achieve the above, are tabled hereunder.

Table 5-3: Summary of actions, phase and responsible role players for reducing the pressure on socio-economic infrastructure/services and possible social conflicts from an in migrating workforce

ACTION	PHASE	ROLE PLAYERS
Where possible, make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically for unskilled	• Pre-construction • Construction	• Eskom

ACTION	PHASE	ROLE PLAYERS
and low-skilled job categories. Include 75% target in tender documents. Employment criteria should be communicated to the community in advance (e.g. in newspapers, community forum notice boards, etc);		
Accommodation for non-local members of the workforce, should as far as practically possible be arranged so that unskilled labourers are not left to their own device in which case non-local labourers are likely to accommodate themselves in the small community of Rietkuil.	• Pre-construction • Construction	• Contractor • Eskom
Consider utilising the stakeholders forum to serve as a platform for stakeholders to voice their concerns.	• Pre-construction	• Eskom • Contractors • Local police • Local farmers • Local mining • Surrounding land owners
Ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct.	• Pre-construction	• Eskom • Contractors • Monitoring forum members
Ensure that workers found guilty of breaching the Code of Conduct are dismissed or dealt with in accordance with labour legislation.	• Construction	• Contractors • Monitoring forum members
The contractor should make necessary arrangements to enable workers from outside the area to return home over weekends and or on a regular basis during the construction phase. This would reduce the risk posed by non-local construction workers to local family structures and social networks.	• Construction	• Contractors

5.4 MINIMISE HEALTH, SAFETY AND SECURITY IMPACTS

The management plan for health, safety, and security is relevant to the following phases:

- Construction phase
- Operational phase

5.4.1 HEALTH, SAFETY AND SECURITY – CONSTRUCTION

During the construction phase the following management aspects apply:

- **Objective:** Avoid or reduce the possible increase in crime and safety and security issues as well as avoid or decrease the possible decline in health issues during the construction phase
- **Project component/s**: construction of solar energy facility and associated infrastructure
- **Potential impact/s:** Decrease in health and an increase in crime due to influx of non-local construction workers housed locally for the duration of the construction phase
- **Risk/activity source:** In migration of temporary workforce and job seekers in small communities

- **Enhancement target/s:**
  - To maximise use of local workforce
  - Aim for 75% of unskilled and low-skilled workforce to be sourced from the local area
  - To avoid/minimise the potential impact on health, safety and security on local communities
- **Performance indicator/s:**
  - Employee induction, covering access protocols, fire management, safety
  - The construction site is appropriately secured with a controlled gate system and security lighting
  - Security personnel on site on a permanent basis
  - Avoid or reduce potential safety and security aspects
  - Avoid or reduce potential health aspects
- **Monitoring**:
  - Eskom and the contractor must monitor the above listed indicators to ensure that are being met for the construction phase

The enhancement actions as well as the phasing and relevant role player for each action, in order to achieve the above, are tabled hereunder.

Table 5-4: Summary of actions, phase and responsible role players for reducing the possible increase in crime and safety and security issues during the construction phase

ACTION	PHASE	ROLE PLAYERS
Appoint as many locally unemployed unskilled or low-skilled labourers from Rietkuil and surrounds to lessen risk of unacceptable social behaviour and to minimise the potential for criminal activity or perceived perception of an increase in criminal activity due to the presence of an outside workforce and influx of people.	• Pre-construction	• Eskom • Contractors
Screening prior to hiring should be undertaken, and proper monitoring procedures should adhered to minimise the risk of crime and violent behaviour.	• Pre-construction	• Eskom • Contractors
Fence off the construction area to avoid unauthorised access. Access control and a method of identification of site personnel are required at all times. Security lighting should be implemented.	• Pre-construction • Construction	• Eskom
It is specifically recommended that site 1 and 3, be accessed for construction activities through the main road to the south of the sites and not through the Arnot Power station.	• Construction	• Contractors
Ensure that security personnel are on site on a permanent basis.	• Construction • Operation	• Eskom
Working hours should be kept between 7am and 5pm as to be agreed with surrounding landowners and occupiers	• Construction	• Contractors
Local community organisations, adjacent land owners, policing forums / neighbourhood watches must be informed of construction times and the duration of the construction phase.	• Pre-construction • Construction	• Eskom • Contractors • Community organisations

ACTION	PHASE	ROLE PLAYERS
Liaise with existing forums to communicate information to the community and to assist in the monitoring of compliance.		• Policing forums • Land owners
Ensure that open fires on the site for heating, smoking or cooking are not allowed except in designated areas	• Construction	• Contractor
Provide adequate firefighting equipment on site and provide firefighting training to selected construction staff.	• Pre-construction • Construction	• Contractor
A comprehensive employee induction programme should be developed to cover land access protocols, road safety, etc	• Pre-construction • Construction	• Contractor
All vehicles must be road worthy and drivers must be qualified and made aware of the potential road safety issues and follow the speed limits.	• Pre-construction • Construction	• Contractor
Adequate signage along the road leading to the Power station and Rietkuil needs to be provided to warn motorists of the construction activities taking place.	• Construction	• Contractor
Ensure that proper safety gear are administered and safety precautions are taken.	• Construction	• Contractor • Labourers
Design, implement and enforce an appropriate Safety, Health and Environment programme and code of conduct (with strict control measures) that includes the use of Personal Protective Equipment to ensure the well-being of workers.	• Pre-construction • Construction	• Eskom • Contractor • Labourers
Liaise with the South African Police Services in order to implement effective crime prevention strategies.	• Pre-construction • Construction	• Eskom • Contractor • SA Police Services

5.4.2 HEALTH, SAFETY AND SECURITY – OPERATION

During the operation phase the following management aspects apply:

- **Objective:** Avoid or reduce the possible increase in crime and safety and security issues as well as avoid or decrease the possible decline in health issues during the operation phase
- **Project component/s**: operation of solar energy facility and associated infrastructure
- **Potential impact/s:**
    - The new development could attract criminal activity and vandalism as there is increased activity in the area.
    - The generation of electricity from PV solar panels is safe and effective, however there are potential health and safety hazards associated with the full product life cycle of photovoltaics'.
    - Improper disposal of solar panels at the end of their useful life also presents a health and safety concern.

- **Risk/activity source**:
    - The glare from the PV field and associated infrastructure
    - In event of a fire, it is possible for hazardous fumes to be released and inhalation of these fumes could pose a risk to human health.

- **Enhancement target/s:** To avoid/minimise the potential impact on health, safety and security
- **Performance indicator/s:**
  - Employee induction, covering access protocols, fire management, safety
  - The operation site is appropriately secured with a controlled gate system and security lighting
  - Security personnel on site on a permanent basis
- **Monitoring**: Eskom must monitor the above listed indicators to ensure that are being met for the operation phase

The enhancement actions as well as the phasing and relevant role player for each action, in order to achieve the above, are tabled hereunder.

Table 5-5: Summary of actions, phase and responsible role players for reducing the possible increase in crime and safety and security issues during the operation phase

ACTION	PHASE	ROLE PLAYERS
Safety at and around the site should be ensured by limiting any fire risks, fencing off the site to avoid unauthorised access and employing permanent security personnel. No unauthorised entry to the site is to be allowed; access control and a method of identification of maintenance personnel are required at all times.	• Operation	• Eskom
Employ the services of a health and safety expert to investigate the potential from fire from activities at the Rietkuil raceway in relation to potential onset of fire.	• Planning • Construction	• Eskom
The security must be provided with adequate firefighting equipment on site and be provided with firefighting training. The security must ensure that open fires on the site for heating, smoking or cooking are only allowed in designated areas.	• Operation	• Eskom • Security
Establish a code of conduct to increase public safety for the site and surrounds	• Operation	• Eskom
Provide informative information to public to mitigate potential uniformed negative perceptions of health impacts	• Operation	• Eskom
Ensure proper disposal of solar panels at the end of their useful life to avoid health and safety concerns.	• Decommissioning	• Eskom • Contractors

5.5 MINIMISE NUISANCE, NOISE, AND OTHER DISRUPTIONS AND CHANGE IN QUALITY OF LIVING ENVIRONMENT

During the construction phase the following management aspects apply:

- **Objective:** To minimise the potential impacts of nuisance, noise and other disruptions and to minimise the change in quality of living environment during the construction phase
- **Project component/s**: construction of solar energy facility and associated infrastructure
- **Potential impact/s:** during the construction phase, it is expected that there will be a decrease in the quality of the physical environment as noise levels, traffic volumes, dust, etc. will increase from construction activities.

- **Risk/activity source:** Construction activities
- **Enhancement target/s:** To avoid and or minimise the potential nuisances, noise and other disruptions and change in quality of living environment associated with construction activities
- **Performance indicator/s:**
  - Dust suppression measures implemented
  - Enforcement of strict speeding limits
  - Road worthy certificates in place for all vehicles
- **Monitoring**:
  - The contractor must monitor the above listed indicators to ensure that are being met for the construction phase
  - Adequate monitoring of the biophysical impacts should occur in order to address any unnecessary inconveniences to stakeholders

The enhancement actions as well as the phasing and relevant role player for each action, in order to achieve the above, are tabled hereunder.

Table 5-6: Summary of actions, phase and responsible role players for reducing the possible increase in nuisance, noise, disruptions, and change in quality of living environment during construction

ACTION	PHASE	ROLE PLAYERS
Residents in close proximity to the development site should be notified 24 hours prior to any planned activities that will be unusually noisy.	• Construction	• Contractor
Construction related activities should be limited to work days (Monday to Friday daylight hours) and the impact on traffic patterns should be mitigated by instating traffic off-peak times	• Construction	• Contractors
Movement of abnormal loads should be timed to avoid times of the year when traffic volumes are likely to be higher, such as start and end of school holidays, long weekends and weekends in general, etc.	• Construction	• Contractor
Ensure that damage caused by construction related traffic to access roads is repaired	• Construction	• Contractor
Implement dust suppression measures for heavy vehicles	• Construction	• Contractor
Ensure all vehicles are road worthy, drivers are qualified, made aware of the potential noise and dust issues, and adhere to speed limits.	• Construction	• Contractor
Plant tall trees as barriers along the southern boundary of site 1 to reduce impacts to adjacent properties similar to the avenue of trees to the south of site 3. A barrier of trees (or other) could also be considered as screens to the eastern portion of the northern half of site 1 to screen impact to the hostel dwellers.	• Pre-construction	• Eskom

5.6 MINIMISE VISUAL LAND USE PATTERNS ALTERATION AND CHANGE IN SENSE OF PLACE AND OTHER SPATIAL CONSIDERATIONS

The management plan for visual land use patterns alteration and change in sense of place and other spatial considerations is relevant to the following phases:

- Construction phase
- Operational phase
- Decommissioning phase

5.6.1 VISUAL AND LAND USE PATTERNS ALTERATION AND CHANGE IN SENSE OF PLACE AND OTHER SPATIAL CONSIDERATIONS – CONSTRUCTION

During the construction phase the following management aspects apply:

- **Objective:** To minimise visual intrusion, change in sense of place, and alteration of land use patterns
- **Project component/s**: construction of solar energy facility and associated infrastructure
- **Potential impact/s:** change in visual receptors and sense of place
- **Risk/activity source:** Construction activities
- **Enhancement target/s:** To reduce visual disturbances and to minimise the loss in sense of place
- **Performance indicator/s:** Construction yards where building material is stored and temporary worker's houses and site offices are located and construction activities cause minimum visual distraction.
- **Monitoring**: Adequate monitoring of the impacts should occur in order to address any unnecessary inconveniences to stakeholders.

The enhancement actions as well as the phasing and relevant role player for each action, in order to achieve the above, are tabled hereunder.

Table 5-7: Summary of actions, phase and responsible role players for reducing the visual intrusion, change in sense of place, and alteration of land use patterns during the construction phase

ACTION	PHASE	ROLE PLAYERS
Residents in close proximity to the development site should be notified 24 hours prior to any planned activities that will be visible.	• Construction	• Contractors
Plant tall trees as barriers in the regions where such trees do not exist to reduce visual intrusion. In this regard consider planting tall trees as barriers along the southern boundary of site 1 to reduce impacts to adjacent properties similar to the avenue of trees to the south of site 3. A barrier of trees (or other) could also be considered as screens to the eastern portion of the northern half of site 1 to screen impact to the hostel dwellers.	• Construction	• Eskom
Put measures in place to ensure that construction boundaries are demarcated, the areas of surface disturbance is minimised, the construction site is neat, tidy and contained.	• Construction	• Eskom • Contractors
Construction of new roads should be minimised and existing roads should be used where possible.	• Planning • Construction	• Eskom

ACTION	PHASE	ROLE PLAYERS
Dust generation should be minimised as much as possible as this can also increase the visibility of the construction phase. Dust suppression measures must be implemented.	• Construction	• Contractors
Erosion risks should be assessed and minimised as erosion scarring can create areas of strong visual contrast which can often be seen from long distances. Laydown areas and stockyards should be located in low visibility areas (e.g. valleys between ridges) and existing vegetation should be used to screen them from views where possible.	• Construction	• Contractors
Night lighting of the construction sites should be minimised within requirements of safety and efficiency.	• Construction	• Contractors
Put measures in place to ensure that construction yards where building material is stored and temporary worker's houses and site offices are located cause minimum visual distraction. Also in this regard, with reference to site 1 and site 3, consider construction access from the adjacent road as opposite to through the Eskom property as this will cause greater visual impact to Arnot residents.	• Construction	• Contractors

5.6.2 VISUAL AND LAND USE PATTERNS ALTERATION AND CHANGE IN SENSE OF PLACE AND OTHER SPATIAL CONSIDERATIONS – OPERATIONS

During the operation phase the following management aspects apply:

- **Objective:** To minimise visual intrusion, change in sense of place, and alteration of land use patterns
- **Project component/s**: operation and maintenance of solar energy facility and associated infrastructure
- **Potential impact/s:** change in visual receptors and sense of place
- **Risk/activity source:** The glare from the PV field and associated infrastructure
- **Enhancement target/s:** To reduce visual disturbances and to minimise the loss in sense of place
- **Performance indicator/s:** Restrain light output and glare, plant vegetation, ensure management and maintenance of infrastructure
- **Monitoring**: Adequate monitoring of the impacts should occur in order to address any unnecessary inconveniences to stakeholders.

The enhancement actions as well as the phasing and relevant role player for each action, in order to achieve the above, are tabled hereunder.

Table 5-8: Summary of actions, phase and responsible role players for reducing the visual intrusion, change in sense of place, and alteration of land use patterns during the operation phase

ACTION	PHASE	ROLE PLAYERS
Additional vegetation between the site and adjacent properties should be considered where required. Plant tall trees as barriers in the regions where such trees do not exist to reduce visual intrusion. In this regard consider planting tall trees as barriers along the southern boundary of site 1 to reduce impacts to adjacent properties similar to the avenue of trees to the south of site 3. A barrier of trees (or other) could also be considered as screens to the eastern portion of the northern half of site 1 to screen impact to the hostel dwellers. Plant some more trees as screen south of site 3 between site 3 and 3 farm dwellers accommodation.	• Construction	• Eskom
Ensure management and maintenance of infrastructure during operations	• Operation	• Eskom

5.6.3 VISUAL AND LAND USE PATTERNS ALTERATION AND CHANGE IN SENSE OF PLACE AND OTHER SPATIAL CONSIDERATIONS – DECOMMISSIONING

During the decommissioning phase the following management aspects apply:

- **Objective:** To rehabilitate the decommissioned site and cease any visual intrusion, change in sense of place, and alteration of land use patterns
- **Project component/s**: dismantling of structures and infrastructure and rehabilitation **Potential impact/s:** change in visual receptors and sense of place
- **Risk/activity source:** dismantling of structures and infrastructure
- **Enhancement target/s:** To rehabilitate the site
- **Performance indicator/s:** Site rehabilitated
- **Monitoring**: Adequate monitoring of the impacts should occur in order to address any unnecessary visual distraction on sense of place.

The enhancement actions as well as the phasing and relevant role player for each action, in order to achieve the above, are tabled hereunder.

Table 5-9: Summary of actions, phase and responsible role players for rehabilitating the visual intrusion, sense of place, and land use patterns during the decommissioning phase

ACTION	PHASE	ROLE PLAYERS
All structures and infrastructure associated with the proposed facility should be dismantled and transported off-site on decommissioning	• Decommissioning	• Eskom • Contractors
Rehabilitation of the decommissioned site could entail grading, scarifying, seeding and planting.	• Decommissioning	• Eskom • Contractors

5.7 MINIMISE IMPACTS ON ARNOT RESIDENTS

The management plan for tourism and aesthetics is essentially relevant to the following phases:

- Construction phase
- Operational phase

5.7.1 IMPACT ON ARNOT RESIDENTS– CONSTRUCTION

During the construction phase the following management aspects apply:

- **Objective:** To avoid/minimise the potential impacts of nuisance, noise, dust, visual disturbance, safety of residents, quality of life, during the construction phase
- **Project component/s**: construction of solar energy facility and associated infrastructure
- **Potential impact/s:** decrease in the quality of the physical environment surrounding the residents with increased noise levels, traffic volumes, dust, decreased safety, decreased quality of living from the construction activities.
- **Risk/activity source:** Construction activities
- **Enhancement target/s:**
    - To avoid and or minimise the potential nuisances, noise disruptions, declined safety, to residents associated with construction activities
- **Performance indicator/s:**
    - The construction site is appropriately secured with a controlled gate system and security lighting
    - Security personnel on site on a permanent basis
    - Employee induction, covering access protocols, fire management, safety
    - Avoid or reduce potential safety and security aspects
    - Avoid or reduce potential health aspects
    - Avoid or reduce noise/dust
    - Enforcement of strict speeding limits
    - Road worthy certificates in place for all vehicles
- **Monitoring**:
    - Eskom and the contractor must monitor the above listed indicators to ensure that are being met for the construction phase

The enhancement actions as well as the phasing and relevant role player for each action, in order to achieve the above, are tabled hereunder.

Table 5-10: Summary of actions, phase and responsible role players for reducing the impact on Arnot residents during the construction phase

ACTION	PHASE	ROLE PLAYERS
Dust and noise generation should be minimised as much as possible through implementing dust and noise suppression measures	• Construction	• Contractors
Traffic calming measures should be put in place to deter any unnecessary through-traffic through the surrounding residential environs	• Construction	• Contractors
Residents should be notified days in advance prior to any planned activities that will be unusually noisy	• Construction	• Contractors
Ensure all vehicles are road worthy, drivers are qualified, made aware of the potential noise and dust issues, and adhere to speed limits.	• Construction	• Contractors

ACTION	PHASE	ROLE PLAYERS
Safety at and around the site should be ensured by limiting any fire risks, fencing off the site to avoid unauthorised access and employing permanent security personnel.	• Construction • Operation	• Eskom • Contractors
Site 1 should be accessed for construction activities through the main road to the south of the site and not through the Arnot Power station. The construction activities at both sites also need to be fenced off so that construction workers do not wonder over to residents and or hostel dwellers at Arnot.	• Construction	• Contractors
Establish a code of conduct to increase public safety for the site and surrounds which has a focussed section on ensuring safety for scholars/teachers, etc.	• Construction	• Eskom

5.7.2 IMPACT ON ARNOT RESIDENTS– OPERATION

During the operation phase the following management aspects apply:

- **Objective:** To minimise visual intrusion to Arnot residents
- **Project component/s**: operation and maintenance of solar energy facility and associated infrastructure
- **Potential impact/s:** change in visual receptors
- **Risk/activity source:** The glare from the PV field
- **Enhancement target/s:** To reduce visual disturbances
- **Performance indicator/s:** Restrain light output and glare
- **Monitoring**: Adequate monitoring of the impacts should occur in order to address any unnecessary inconveniences to stakeholders.

The enhancement actions as well as the phasing and relevant role player for each action, in order to achieve the above, are tabled hereunder.

Table 5-11: Summary of actions, phase and responsible role players for reducing the visual intrusion on residents at Arnot during the operation phase

ACTION	PHASE	ROLE PLAYERS
PV panels should be located as such to ensure that visual impacts are minimised without compromising efficiency. The lowest possible height for the PV panels, without compromising efficiency, is suggested so that the visual intrusion is lessened.	• Construction	• Contractors
A wall (or buffer of natural vegetation) should be built (or maintained) along the sides of the Arnot residencies to assist with screening the PV panels.	• Construction	• Eskom • Contractors
Ensure management and maintenance of infrastructure during operations	• Operation	• Eskom

5.8 MINIMISE IMPACTS ON AGRICULTURE

The management plan for the agriculture sector is dealt with during the following phases:

- Construction phase
- Operation phase
- Decommissioning phase

5.8.1 IMPACT ON AGRICULTURE– CONSTRUCTION

During the construction phase the following management aspects apply:

- **Objective:** To minimise the potential impacts of noise, dust and other disruptions which could potentially be a nuisance to surrounding agricultural activities.
- **Project component/s**: construction of solar energy facility and associated infrastructure
- **Potential impact/s:** during the construction phase, it is expected that there will be a decrease in the quality of the physical environment as noise levels, traffic volumes, dust, etc. will increase from construction activities which could pose a nuisance to agricultural activities.
- **Risk/activity source:** Construction activities
- **Enhancement target/s:** To avoid and or minimise the potential nuisances, noise and other disruptions to the surrounding agriculture sector associated with construction activities
- **Performance indicator/s:**
  - Dust and noise suppression measures implemented
  - Notice to surrounding farmers of any activities within audible/visible range
- **Monitoring**:
  - The contractor must monitor the above listed indicators to ensure that are being met for the construction phase
  - Adequate monitoring of the biophysical impacts should occur in order to address any unnecessary inconveniences to stakeholders

The enhancement actions as well as the phasing and relevant role player for each action, in order to achieve the above, are tabled hereunder.

Table 5-12: Summary of actions, phase and responsible role players for reducing the potential nuisance impacts to the agriculture sector during the construction phase

ACTION	PHASE	ROLE PLAYERS
Surrounding farmers should be notified prior to any planned activities that will be within visible/audible range	• Construction	• Contractors • Surrounding farmers
Dust and noise generation should be minimised as much as possible	• Construction	• Contractors

5.8.2 IMPACT ON AGRICULTURE– OPERATION

During the operation phase the following management aspects apply:

- **Objective:** To minimise visual intrusion to agricultural entities and residents north of the proposed site
- **Project component/s**: operation and maintenance of solar energy facility and associated infrastructure
- **Potential impact/s:** change in visual receptors for agricultural activities north of the proposed site
- **Risk/activity source:** The glare from the PV field

- **Enhancement target/s:** To reduce visual disturbances and to minimise any negative visual impacts
- **Performance indicator/s:** Restrain light output and glare, plant vegetation, ensure management and maintenance of infrastructure
- **Monitoring**: Adequate monitoring of the impacts should occur in order to address any unnecessary inconveniences to stakeholders.

The enhancement actions as well as the phasing and relevant role player for each action, in order to achieve the above, are tabled hereunder.

Table 5-13: Summary of actions, phase and responsible role players for reducing the visual intrusion to surrounding agricultural activities north of site during the operation phase

ACTION	PHASE	ROLE PLAYERS
A buffer of natural vegetation should be maintained along the south of proposed site 1 and site 3 to assist with screening the PV panels where required.	• Operation	• Eskom
PV panels should be located as such to ensure that visual impacts are minimised without compromising efficiency	• Construction	• Contractors
The lowest possible height, without compromising efficiency, is suggested for the PV panels so that the visual intrusion is lessened.	• Construction	• Contractors
Ensure management and maintenance of infrastructure during operations	• Operation	• Eskom

5.8.3 IMPACT ON AGRICULTURE– DECOMMISSIONING

During the decommissioning phase the following management aspects apply:

- **Objective:** To rehabilitate the decommissioned site and cease any visual intrusion to agricultural activities north of the proposed site
- **Project component/s**: dismantling of structures and infrastructure and rehabilitation
- **Potential impact/s:** change in visual receptors and sense of place
- **Risk/activity source:** dismantling of structures and infrastructure
- **Enhancement target/s:** To rehabilitate the site
- **Performance indicator/s:** Site rehabilitated
- **Monitoring**: Adequate monitoring of the impacts should occur in order to cease visual disturbance to agricultural activities and homesteads.

The enhancement actions as well as the phasing and relevant role player for each action, in order to achieve the above, are tabled hereunder.

Table 5-14: Summary of actions, phase and responsible role players for ceasing any visual disturbance to agricultural activities north of the site during the decommissioning phase

ACTION	PHASE	ROLE PLAYERS
All structures and infrastructure associated with the proposed facility should be dismantled and transported off-site on decommissioning.	• Decommissioning	• Contractors

ACTION	PHASE	ROLE PLAYERS
Rehabilitation of the decommissioned site could entail grading, scarifying, seeding and planting.	• Decommissioning	• Contractors • Eskom

6. KEY FINDINGS, RECOMMENDATIONS, AND NEED AND DESIRABILITY

6.1 SUMMARY OF KEY SOCIAL FINDINGS

The identified social impacts and their significance ratings, without mitigation are set out below.

Table 6-1: Identified significance of social impacts per phase without mitigation

IMPACTS	PHASES	WITHOUT MITIGATION			
		Planning	Construction	Operational	Decommissioning
New business sales, multipliers and economic stimulation		L	M	L	
Employment and skills transferral		L	M	L	N
In-migration on social dynamics and pressure on services			L		
Health, safety and security			L	L	
Nuisance, noise, and change in quality of living environment			L		
Change in visual, land use patterns, and sense of space			M	M	L
Impact on Arnot residents			M	M	L
Agricultural compatibility			L	L/N	L
Development of clean renewable energy				M	

The negative findings of the social impact reveal that:

- As with any construction activity, possible in-migration of outsiders could impact on social dynamics and put increased pressure on services
- Health, safety and security concerns result during construction as well as during operation, although if property mitigated during operation this impact could be neutralised
- The construction activities will results in nuisance, noise and change in quality of living environment for the 12 month duration of the construction phase
- A change in visual, land use patterns and sense of place could occur during construction, operation and decommissioning which would impact nearby Rietkuil and Arnot hostel residents
- The agriculture sector will be impacted, although the effects on the farmland would however not represent a loss in production nor reduction in the farm's permanent workforce.
- Residents at Arnot hostels will be impacted during construction and operation

The positive findings of the social impact reveal that:

- Solar energy production is strongly supported at a national, provincial, and local level.
- Solar energy, specifically PV solar energy, provides the region with an opportunity to diversify its economy in a way that is not dependent on non-renewable resources and will lead to new business sales and economic stimulation.

- Solar energy production will create employment opportunities for locals during both the construction and operational phase of the project as well as employment opportunities for non-locals during the planning phase.
- Solar energy production represents an investment in clean, renewable energy production.

6.2 SUMMARY OF KEY SOCIAL MITIGATION RECOMMENDATIONS

The identified social impacts and their significance ratings, with mitigation are set out below.

Table 6-2: Identified significance of social impacts per phase – with mitigation

IMPACTS	PHASES	WITH MITIGATION			
		Planning	Construction	Operational	Decommissioning
New business sales, multipliers and economic stimulation		L	M	L	
Employment and skills transferral		L	M	L	L
In-migration on social dynamics and pressure on services			L/N		
Health, safety and security			L/N	N	
Nuisance, noise, and change in quality of living environment				L	
Change in visual, land use patterns, and sense of space			L	L	L
Impact on Arnot residents			M	L	
Agricultural compatibility			L	L/N	L
Development of clean renewable energy				M	

The following mitigation measures are recommended to limit the negative impacts and enhance the positive impacts during the construction phase:

New business sales, multiplier effects and economic stimulation:

- It is recommended that a local procurement policy is adopted to maximise the benefit to the local economy.
- Eskom should seek to develop a database of local companies, specifically Broad Based Black Economic Empowerment (BBBEE) companies, which qualify as potential service providers (e.g. construction companies, security etc.) prior to the commencement of the tender process for construction contractors. These companies should be notified of the tender process and invited to bid for project-related work.
- To source as much good and services as possible from the local area; engage with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods and products from local suppliers where feasible
- It is furthermore suggested that all the employees should be motivated to spend their earned income locally. This can be achieved by ensuring that the goods and services required by the employees are provided locally (if possible), so that they do not need to spend their money elsewhere. This would be the responsibility of local shop owners, within the Eskom property and at Rietkuil.

- Eskom, or the contractors appointed, in consultation with the local municipality and local Chamber of business, should identify strategies aimed at maximising the potential benefits associated with the project.

Employment and skills transfer:

- A local employment policy could be adopted to maximise the opportunities made available Where reasonable and practical the contractors appointed by the proponent should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. However, due to the low skills levels in the area, the majority of skilled posts are likely to be filled by people from outside the area.
- Opportunities for training of workers should be maximised
- Ways to enhance local community benefits with a focus on broad based BEE need to be explored
- Local construction companies should be used whenever possible, especially for subcontracting work.
- Local suppliers should be used as far as possible.
- Labour based construction methods should be used whenever practically possible. It is important to follow the principles of the Expanded Public Works Programme and apply effective labour-based construction technologies in order to increase the job creation effects.
- The use of local labour should be approached in such a manner that large numbers of local residents can benefit from this action rather than only a select few.
- Note that while preference to local employees and companies is recommended, it is recognised that a competitive tender process may not guarantee the employment of local labour for the construction phase.

In-migration of temporary workers and effect on social dynamics of area and increased pressure on socio-economic infrastructure and services:

- Employment criteria should be communicated to the community in advance (e.g. in newspapers, community forum notice boards, etc);
- Local, unemployed labour should be employed as far as possible;
- Accommodation for non-local members of the workforce, should as far as practically possible be arranged so that unskilled labourers are not left to their own device in which case non-local labourers are likely to accommodate themselves in Rietkuil;
- The only semi-permanent structures that should be allowed on site is guard houses for security personnel;
- Where possible, Eskom should consider to make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically semi and low-skilled job categories. This will reduce the potential impact that this category of worker could have on local family and social networks.
- The movement of construction workers on and off the site should be closely managed and monitored by the contractors. In this regard the contractors should be responsible for making the necessary arrangements for transporting workers to and from site on a daily basis.
- The contractor should make necessary arrangements to enable workers from outside the area to return home over weekends and or on a regular basis during the construction phase. This would reduce the risk posed by non-local construction workers to local family structures and social networks.
- The contractor should make the necessary arrangements for ensuring that all non-local construction workers are transported back to their place of residence once the construction phase is completed.

- An employee induction programme should be considered to issues such as HIV/ AIDS and TB as well as alcohol and substance abuse. The induction should also address a code of conduct for employees that would align with community values.

Health, safety and security:

- Safety at and around the construction site should be ensured by limiting any risks, fencing off the construction area to avoid unauthorised access and employing security personnel
- It is specifically recommended that site 1 and 3, be accessed for construction activities through the main road to the south of the sites and not through the Arnot Power station. The construction activities at both sites also need to be fenced off so that construction workers do not wonder over to residents and or hostel dwellers at Arnot.
- Employing local community members could minimise the potential for criminal activity or perceived perception of an increase in criminal activity due to the presence of an outside workforce and influx of people
- Working hours should be kept between 7am and 5pm
- The perimeter of the construction site should be appropriately secured to prevent any unauthorised access to the site; the fencing of the site should be maintained throughout the construction period
- No unauthorised entry to the site is to be allowed; access control and a method of identification of site personnel are required at all times
- Security lighting should be implemented
- The contractor must ensure that open fires on the site for heating, smoking or cooking are not allowed except in designated areas
- A comprehensive employee induction programme would cover land access protocols, road safety, etc
- All vehicles must be road worthy and drivers must be qualified and made aware of the potential road safety issues and follow the speed limits.
- Adequate signage along the road leading to the Power station and Rietkuil needs to be provided to warn motorists of the construction activities taking place
- Risks that labourers undergo during the construction of the proposed development can be minimised by ensuring that proper safety gear are administered and safety precautions are taken. Basic concepts and information should be communicated to labourers so that they are well informed of the risks of over exposure to the sun and stay hydrated throughout the construction phase.
- To minimise the risk of petty crime and violent behaviour, proper procedures such as screening prior to hiring should be undertaken, and proper monitoring procedures should be adhered to during this phase.
- Design, implement and enforce an appropriate Safety, Health and Environment programme that includes the use of Personal Protective Equipment to ensure the well-being of workers.
- Establish a code of conduct for construction workers with strict control measures;
- Liaise with the South African Police Services in order to implement effective crime prevention strategies;
- Liaise with existing forums in the community to communicate information to the community and to assist in the monitoring of compliance.
- Aim to appoint as many locally unemployed from Rietkuil to lessen risk of unacceptable social behavior.
- Ensure that any unlawful occupants on Eskom owned property, especially those residing in north of site 3 and next to the sewerage works, are evicted.

Nuisance, noise, disruptions, dust and change in quality of living environment:

- The contractor must ensure that damage caused by construction related traffic to access roads is repaired
- Dust suppression measures must be implemented
- Abnormal loads should be timed to avoid times of the year when traffic volumes are likely to be higher, such as start and end of school holidays, long weekends and weekends in general etc.
- Residents in close proximity to the development site should be notified 24 hours prior to any planned activities that will be unusually noisy.
- An existing landowner's forum could serve as liaison between the affected stakeholders and the developer and can discuss traffic, dust, noise and other construction related concerns with the developer.
- Construction related activities should be limited to work days (Monday to Friday daylight hours) and the impact on traffic patterns should be mitigated by instating traffic off-peak times.
- Adequate monitoring of the biophysical impacts should occur in order to address any unnecessary inconveniences to stakeholders
- Consider planting tall trees as barriers along the southern boundary of site 1 to reduce impacts to adjacent properties similar to the avenue of trees to the south of site 3. A barrier of trees (or other) could also be considered as screens to the eastern portion of the northern half of site 1 to screen impact to the hostel dwellers.

Impact of visual and land use patterns alteration:

- Dust suppression measures must be implemented
- Residents in close proximity to the development site should be notified 24 hours prior to any planned activities that will be visible.
- The existing landowners forum could serve as liaison between the affected stakeholders and the developer and can discuss traffic, dust, noise and other construction related concerns with the developer;
- Adequate monitoring of the biophysical impacts should occur in order to address any unnecessary inconveniences to stakeholders
- Plant tall trees as barriers in the regions where such trees do not exist to reduce visual intrusion. In this regard consider planting tall trees as barriers along the southern boundary of site 1 to reduce impacts to adjacent properties similar to the avenue of trees to the south of site 3. A barrier of trees (or other) could also be considered as screens to the eastern portion of the northern half of site 1 to screen impact to the hostel dwellers.
- Little measures exist to control the visual impact caused by the construction activities, although measures can be put in place to ensure that construction yards where building material is stored and temporary worker's houses and site offices are located cause minimum visual distraction. Also in this regard, with reference to site 1 and site 3, consider construction access from the adjacent road as opposite to through the Eskom property as this will cause greater visual impact to Arnot residents.
- Project developers should demarcate construction boundaries and minimise areas of surface disturbance.
- Construction of new roads should be minimised and existing roads should be used where possible.
- Erosion risks should be assessed and minimised as erosion scarring can create areas of strong visual contrast which can often be seen from long distances. Laydown areas and stockyards should be located in low visibility areas (e.g. valleys between ridges) and existing vegetation should be used to screen them from views where possible.

- Night lighting of the construction sites should be minimised within requirements of safety and efficiency.
- Dust generation should be minimised as much as possible as this can also increase the visibility of the construction phase.

Impact on Arnot residents:

- Dust and noise generation should be minimised as much as possible
- Traffic calming measures should be put in place to deter any unnecessary through-traffic through the surrounding residential environs
- Dust suppression measures must be implemented
- Residents should be notified days in advance prior to any planned activities that will be unusually noisy
- Safety at and around the construction site should be ensured by limiting any risks, fencing off the construction area to avoid unauthorised access and employing security personnel
- It is specifically recommended that site 1 be accessed for construction activities through the main road to the south of the sites and not through the Arnot Power station. The construction activities at both sites also need to be fenced off so that construction workers do not wonder over to residents and or hostel dwellers at Arnot.
- Working hours should be kept between 7am and 5pm
- The perimeter of the construction site should be appropriately secured to prevent any unauthorised access to the site; the fencing of the site should be maintained throughout the construction period
- No unauthorised entry to the site is to be allowed; access control and a method of identification of site personnel are required at all times
- Security lighting should be implemented
- **Impacts on agriculture:**
- Surrounding farmers should be notified prior to any planned activities that will be within visible/audible range
- Dust and noise generation should be minimised as much as possible

The following mitigation measures are recommended to limit the negative impacts and enhance the positive impacts during the operation phase:

Employment and skills transfer:

- It is recommended that a local employment be utilised by Eskom to maximise the project opportunities being made available to the local labour force for unskilled labour
- Eskom should consider to provide vocational training programs for the local labour force to promote the development of skills

Health, safety and security:

- Safety at and around the site should be ensured by limiting any fire risks, fencing off the site to avoid unauthorised access and employing security personnel
- No unauthorised entry to the site is to be allowed; access control and a method of identification of maintenance personnel are required at all times
- The security must ensure that open fires on the site for heating, smoking or cooking are only allowed in designated areas n
- The security must be provided with adequate firefighting equipment on site and be provided with firefighting training.
- Establish a code of conduct to increase public safety for the site and surrounds
- Employ the services of a health and safety expert to investigate the potential from fire from activities at the Rietkuil raceway in relation to potential onset of fire.

Visual and land use:

- It is advised that light output and glare be restrained as much as possible.
- Additional vegetation between the site and adjacent properties should be considered where required.
- Plant tall trees as barriers in the regions where such trees do not exist to reduce visual intrusion. In this regard consider planting tall trees as barriers along the southern boundary of site 1 to reduce impacts to adjacent properties similar to the avenue of trees to the south of site 3. A barrier of trees (or other) could also be considered as screens to the eastern portion of the northern half of site 1 to screen impact to the hostel dwellers. Plant some more trees as screen south of site 3 between site 3 and 3 farm dwellers accommodation.

Impact on Arnot residents:

- PV panels should be located as such to ensure that visual impacts are minimised without compromising efficiency
- A wall (or buffer of natural vegetation) should be built (or maintained) along the sides of the Arnot residencies to assist with screening the PV panels
- The lowest possible height for the PV panels, without compromising efficiency, is suggested so that the visual intrusion is lessened.
- Safety at and around the site should be ensured by limiting any fire risks, fencing off the site to avoid unauthorised access and employing security personnel
- No unauthorised entry to the site is to be allowed; access control and a method of identification of maintenance personnel are required at all times
- The security must ensure that open fires on the site for heating, smoking or cooking are only allowed in designated areas
- The security must be provided with adequate firefighting equipment on site and be provided with firefighting training.
- Establish a code of conduct to increase residents safety for the site and surrounds

Impact on agriculture:

- PV panels should be located as such to ensure that visual impacts are minimised without compromising efficiency
- A buffer of natural vegetation should be maintained along the south of proposed site 1 and site 3 to assist with screening the PV panels
- The lowest possible height, without compromising efficiency, is suggested so that the visual intrusion is lessened.

The following mitigation measures are recommended to limit the negative impacts and enhance the positive impacts during the decommissioning phase:

Employment and skills transfer:

- All structures and infrastructure associated with the proposed facility should be dismantled and transported off-site on decommissioning.

Visual and land use alternation and impact on agriculture:

- All structures and infrastructure associated with the proposed facility should be dismantled and transported off-site on decommissioning.
- Rehabilitation of the decommissioned site could entail grading, scarifying, topsoil placement seeding and/or planting.

6.3 SUMMARY OF SOCIAL SITE ALTERNATIVES ASSESSMENT

With regards to **site alternatives**, both site alternatives are comprised of differing land size with consequent different capital expenditure, employment creation and different energy generation.

For the following impacts there is no difference between the site alternatives:

- Fit with policy and planning
- New business sales during the planning phase
- Employment generation and skills transfer during the planning and operation phase

The following aspects however count more favourably for Site 1:

- Offers the least impact on agriculture, as it is not adjacent any existing farmland (as with Site 3)
- Site 1 is planned to produce the most energy (17.2Mw) and thus provide the greatest positive impacts

The following aspects however count more favourably for Site 3:

- Site 3 is potentially slightly better located in regards to potential impacts from in-migration of temporary workers as it is located slightly further away from the Arnot hostels.
- Site 3 offers slightly reduced risks to health, safety and security or Arnot and Rietkuil residents
- Site 3 offers slightly reduced noise, nuisance, and disruptions due to be located further away from Arnot and Rietkuil residents
- Site 3 offers slightly reduced visual impact due to be located further away from Arnot and Rietkuil residents

From a social perspective, site alternative 3 is slightly preferable in that its location provides the least negative impacts. However, site 3 also provides by far the least positive impacts due to its smaller size. Should Edusec be completely demolished perhaps site 1 offers the best alternative, especially since it could either utilise greater space with potentially greater positive impacts, or it could utilise the Edusec space instead of the northern tip of site1 so that the activity is not directly adjacent Arnot residents.

6.4 SUMMARY OF SOCIAL CUMULATIVE IMPACTS

With regards to solar energy production, the cumulative concerns are mostly linked to visual impacts and the impact on rural undeveloped landscapes. In this case much of the landscape is not unscathed, as the presence of the cooling towers, slimes dames, etc. and Arnot power operations are to be seen. Potential cumulative visual issues during operation include:

- Combined visibility (more than just existing visual intrusions but existing Arnot operations combined with proposed solar facilities will be visible from one location.
- Sequential visibility (e.g. the effect of seeing two or more solar farms
- Perceived or actual change in land use across a character type or region
- Loss of a characteristic element (e.g. viewing type or feature) across a character type caused by developments across that character type

Cumulative impacts need to be considered in relation to dynamic as well as static viewpoints. The experience of driving along a tourist road, for example, needs to be considered as a dynamic sequence of views and visual impacts, not just as the cumulative impact of several developments on one location. The viewer may only see one solar facility at a time, but if each successive stretch of the road is dominated by views of solar facilities, then that can be argued to be a cumulative visual impact.

The distinction between cumulative and other impacts is often extremely difficult to make. The assessment of cumulative impacts is also generally more difficult primarily as they often require more onerous assumptions regarding the likely actions of others.

Cumulative impacts have been considered as part of this social impact assessment and identified where relevant. The potential impact of solar facilities on the landscape is an issue that does need to be considered, specifically given South African's strong attachment to the land and the growing number of solar plant applications in the country. With regard to the area, there are limited to no Solar Energy Facilities proposed in the immediate surroundings. There is thus limited potential for cumulative impacts.

Nonetheless, proposed Solar Energy plants cumulatively have the potential to result in significant positive and negative cumulative impacts.

On the positive side, the establishment of a number of Solar Energy Facilities could create a number of socio-economic opportunities, which, in turn, could result in a positive social benefit. The positive cumulative impacts include creation of employment, skills development and training opportunities, and downstream new business sales opportunities, etc. Benefits to the local, regional and national economy through employment and procurement of services could be substantial should many renewable energy facilities proceed. This benefit will of course increase significantly should critical mass be reached that allows local companies to develop the necessary skills to support construction and maintenance activities and that allows for components of the renewable energy facilities to be manufactured locally in South Africa.

There is however risks to a relatively large number of proposed solar energy projects in the wider area. However, the nature of the projects and most probably the significant distances between them should keep these risks to a low level of significance at worst with the potential for risks to decrease to lower levels as solar facilities become a more accepted part of the landscape. Cumulative impacts on agriculture also require consideration particularly if significant amounts of medium to high potential agricultural land would be lost. This is not the case for the Arnot Power station project (i.e. Eskom owned land is being used). Should other solar power projects be produced, it is assumed that the environmental authorities would ensure that no medium or high potential agricultural land is used.

6.5 SUMMARY OF SOCIAL NO-GO OPTION

The impacts of pursuing the No-go Option are both positive and negative as follows:

- The benefits would be that there is no change in status quo in terms of the negative impacts described above during all project phases which would be experienced by neighbours, society and the landscape – namely through disruption, noise, visual, road safety, and tourism impacts. The impact is therefore neutral.
- There would be an opportunity loss in terms of contributing to the renewable energy targets nationally. The impact is therefore negative.
- There would also be an opportunity loss in terms of job creation, skills development and associated economic multipliers for the local economy. The impact is therefore negative.

In short, the no-go development option would represent a lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy. Given South Africa's position as one of the highest per capita producer of carbon emissions in the world, this would represent a high negative social cost. Foregoing the proposed Arnot solar PV energy Facility would not necessarily compromise the development of renewable energy facilities in South Africa. However, the socio-economic benefits for local communities in Rietkuil and Steve Tshwete Local Municipality would be forfeited.

6.6 SUMMARY OF SOCIAL NEED AND DESIRABILITY

The proposed development provides a significant source of additional income while introducing relatively minimal risks with adequate mitigation. Minimal negative impacts are anticipated on agriculture, hostel dwellers and residents at Rietkuil, surrounding farms and farm worker dwellings, etc. as all activities and production will be able to continue as at present.

Herewith a summary of responses to need and desirability components for the proposed solar energy project:

- The development is in line with priorities contained in the IDP and SDF of the area and the development of a diversified, renewable energy source appears to address the need for greater energy supply from non-renewables
- Given the energy crisis being faced, the development should occur at the proposed site at this point in time as it is ideally located to feed into the grid as Eskom Power Station
- The project is a national priority, but the local community/area also needs the activity as it will generate additional employment and knock on effect to businesses. The local policy documents also highlight the need for renewable energy production.
- The necessary services with adequate capacity is currently available (at time of application), so no additional capacity needs to be created to cater for the development. The existing infrastructure (roads, power lines, etc) will be used by Eskom for the proposed project and, this development creates additional energy production.
- The proposed development is not provided for in the infrastructure planning of the municipality, but there is no anticipated negative impact on municipal infrastructure and the proposed development will be provided for and maintained by Eskom.
- The development is part of a national programme to address an issue of national concern, namely non-renewable energy production. The National Integrated Resource Plan for Electricity (IRP2) (2011) suggests that 42 % of national energy supply must come from renewable energy sources between 2010 and 2030.
- The development is most likely the best practicable environmental option for this land/site as the area is already impacted visually with coal mining, cooling towers, slimes dams, etc. The property is owned by Eskom and there are no other land use options for the proposed sites. The solar energy project is a good alternative to the current use of the land, which is currently vacant and not generating any use/value.
- The proposed site is not part of an existing environmental management priority zone or program. The proposed land use would not require active environmental management but rather mitigation of potential negative environmental impacts during the construction phase of the project
- The location factors that favour this land use include: high solar resources, flat topography requiring very little excavation work, on Eskom owned property no landowner consent required, nearby the grid, opportunity for economic upliftment of the local communities.
- The solar energy facility will impact on sensitive cultural areas such as the Arnot hostel residents. However, the proposed development will not be unlike the infrastructure found around the Arnot Power station and is thus not proposed in a pristine unscathed rural area.
- The development will impact on people's health and wellbeing in terms of noise, odours, visual character and sense of place. During construction of the solar facility noise and dust emissions might occur due to the transport of material and workers to/from the site, however this issue will be of temporary duration. This will specifically be relevant for nearby residents from Arnot and Rietkuil. During operation the solar facility would not generate any noise, odours, emissions or significant fire risks. Furthermore, socio-economic benefits are likely to result from the development of the solar energy facility such as creation of jobs and regional economic development. However, as stated previously, the presence of the solar field in a

rural landscape might be perceived by some as visually intrusive or disturbing and subsequently as a negative visual impact.
- The proposed activity will not result in unacceptable opportunity costs as the solar energy facilities can be dismantled and completely removed from the land in question and do not permanently prevent alternative land-uses on the proposed site post operation.
- The proposed land use will not result in unacceptable cumulative impacts.

6.7 OVERALL SOCIAL IMPACT CONCLUSION

From a social perspective it is concluded that both positive and negative social impacts have been identified.

The assessment of the key issues indicated that there are no negative impacts that can be classified as fatal flaws and which are of such significance that it cannot be successfully mitigated. Stated differently, the proposed development is unlikely to result in any permanent damaging social impacts. Positive impacts could be enhanced by implementing appropriate enhancement measures and through careful planning.

Based on the social assessment, the following general conclusions and findings can be made:
- The potential negative social impacts associated with the construction phase are typical of construction related projects and not just focussed on the construction of PV facilities (these relate to influx of non-local workforce and jobseekers, intrusion and disturbance impacts, safety and security) and could be reduced with the implementation of the mitigation measures proposed.
- The potential negative impact associated with the operation phase is that the Solar Energy Facility could have a moderate impact on residents or Anot. Mitigation of the impact is possible, and it is expected to more effective with the use of lower PV panels, without compromising the efficiency as well as with screening the impacts through for instance tree lining.
- New business sales and employment opportunities will be created in the construction and operation phase and the impact are rated as positive even if only relatively few individuals benefit in this regard.
- The proposed project could assist the local economy in creating entrepreneurial development, especially if local business could be involved in the provision of general material and services during the construction and operational phases. Capacity building and skills training among employees are critical and would be highly beneficial to those involved, especially if they receive portable skills to enable them to also find work elsewhere and in other sectors.
- The proposed development also represents an investment in infrastructure for the generation of clean, renewable energy, which, given the challenges created by climate change, represents a positive social benefit for society as a whole.

When considering the overall costs and benefits of the project it is found that the latter is more prominent allowing for the achievement of a net benefit. With respect to risks and negative impacts, these should prove relatively low with mitigation, with the exception of the construction phase impact on Arnot residents. The aforementioned should however prove acceptable provided adequate mitigation is put in place.

It is therefore recommended that proposed Solar PV plant be supported, subject to the implementation of the recommended enhancement and mitigation measures contained in the report. In other words, in terms of the potential social impacts arising from the project, it is found that there is no obvious reason for the competent authority to reject the application on social grounds.

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