January 2023

DONAWAY
ENVIRONMENTAL

Social Impact Assessment

The development of the proposed Naos Solar PV Project Two near Viljoenskroon, Free State Province

PROJECT DETAILS

Project title:	**Social Impact Assessment -** The development of the proposed Naos Solar PV Project Two near Viljoenskroon, Free State Province.
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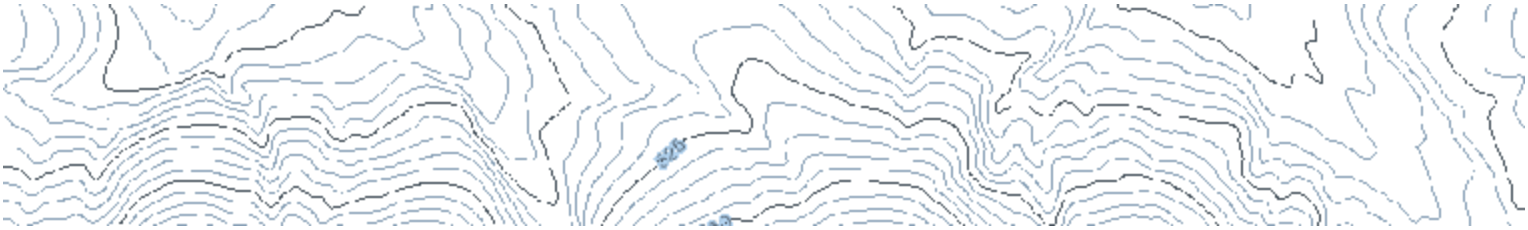
Report date:	January 2023



When used as reference this report should be cited as: Donaway Environmental (2022). Social Impact Assessment: The development of the proposed Naos Solar PV Project Two near Viljoenskroon, Free State Province.

EXECUTIVE SUMMARY

PROJECT BACKGROUND

Naos Solar PV Project Two (Pty) Ltd is proposing the development of the Naos Solar PV Project Two, a commercial Photovoltaic (PV) solar energy facility and associated infrastructure located on Portion 2 of the Farm Waterford No. 573, Moqhaka Local Municipality, Free State Province. The proposed project is intended to form part of the Department of Mineral Resources and Energy (DMRE) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme, but the option also exists for other tenders, wheeling or to supply privately, without a generation license from NERSA, for up to 150MW. The REIPPP Programme aims to secure 14 725 Megawatts (MW) of new generation capacity from renewable energy sources, while simultaneously diversifying South Africa's electricity mix. According to the 2021 State of the Nation Address, Government will soon be initiating the procurement of an additional 11 800 MW of power from renewable energy, natural gas, battery storage and coal in line with the Integrated Resource Plan 2019 and fulfilling their commitments under the United Nations Framework Convention on Climate Change and its Paris Agreement which include the reduction of greenhouse gas emissions. Eskom, our largest greenhouse gas emitter, has committed in principle to net zero emission by 2050 and to increase its renewable capacity.

The proposed Naos Solar PV Project Two development requires Environmental Authorisation (EA) from the National Department of Forestry, Fisheries and the Environment (DFFE) in accordance with the National Environmental Management Act (No. 107 of 1998) (NEMA), and the 2019 Environmental Impact Assessment (EIA) Regulations (GNR 326). The site is located in Renewable Energy Development Zone (REDZ) and therefore a 'basic assessment (BA) process' is required as described in Regulation 19 – 20.

The Social Impact Assessment (SIA) Report has been prepared by Donaway Environmental on behalf of Environamics and is intended to provide input into Basic Assessment Report (BAR) to be submitted to DFFE.

PROJECT DESCRIPTION

The purpose of the proposed PV energy facility will be to evacuate the generated power into the Eskom Holdings SOC Ltd (Eskom) electricity grid. If successful, Naos Solar PV Project Two (Pty) Ltd will be remunerated on a per kilowatt hour generated basis by Eskom in terms of a 20-year Power Purchase Agreement. Naos Solar PV Project Two (Pty) Ltd will be required to apply for a generation license from the National Energy Regulator of South Africa (NERSA). Depending on the economic conditions following the lapse of this period, the facility can either be decommissioned or the power purchase agreement may be renegotiated and extended.

The scope of the assessment includes an up to 200MW Photovoltaic Solar Energy facility covering an area of approximately 300 hectares, options of a 132kV evacuation power line (assessed within a 100m to 150m and up to 600m wide corridor), roads with a width of 12m as part of the Naos Solar PV Project Two.

The construction phase for an entire solar PV project is similar to the proposed Naos Solar PV Project Two and will extend over a period of 12-18 months. The anticipated capital expenditure value of the proposed Naos Solar PV Project Two on completion will be approximately R1.5 billion. The construction phase in terms of employment will employ approximately 500 workers of those

employment opportunities likely to be generated, approximately 60% will accrue to low skilled workers, 25% to semiskilled workers, and 15% to skilled workers. It is anticipated that the operation of the project is likely to create between 50 employment opportunities, comprising of low-skilled, semi-skilled, and skilled opportunities. Employment opportunities include safety and security staff, operation and monitoring, and maintenance crew.

APPROACH TO THE STUDY

The research approach followed for the development of an SIA study is based on the Guidelines for Involving Social Impact Assessment Specialists in the BA process that was prepared for the Department of Environmental Affairs and Development Planning for the Western Cape Province of South Africa in February 2007. These guidelines for development and planning of Social Impact Assessments (SIA) are based on international best practice guidelines. The key components of the SIA process, which are embodied in these guidelines include:

- Describe and obtain a basic understanding of the proposed development (type, scale and location). Also obtain an understanding of the individuals and/or communities which are likely to be affected by the intervention and determine the need and the scope of conducting and SIA.
- Collecting the baseline data for the proposed intervention based on the current social environment and historical social trends.
- Assess and document the significance of the social impacts, which are associated with the proposed intervention; and
- Based on the baseline data and the identification and assessment of the social impacts likely to be associated with the proposed intervention, identify alternatives and mitigation measures for the social impacts of the proposed intervention (Barbour, 2007).

This study followed the research approach similar to the components identified above. This study followed a qualitative research approach. The steps involved in the research approach for this study involved:

- Collection and review of existing information, including national, provincial, district, and local plans, policies, programmes, Census data, and available literature from previous studies conducted within the area. Project specific information was obtained from the project proponent (Naos Solar PV Project Two) and the Environmental Consultant (Environamics).
- Collection of primary data during a site visit. Telephone Interviews were conducted with directly affected landowners, adjacent landowners and key stakeholders (Ward Councillors and business owners located in towns where similar projects must gain their inputs on the project and its perceived social impacts and benefits on the affected community.
- Identification of potential direct, indirect, and cumulative impacts likely to be associated with the construction, operation, and decommissioning of the proposed project.
- Where applicable mitigation measures with which to minimise impacts and enhance benefits associated with the project were identified.
- Preparation of an SIA Report and inputs into the Environmental Management Programme (EMPr) to be prepared for the project.

SUMMARY OF KEY FINDINGS

This SIA focused on the collection of data to identify and assess social issues and potential social impacts associated with the development of Naos Solar PV Project Two. Secondary data was collected and presented in a literature review and primary data was collected through consultations with affected and adjacent landowners and key stakeholders. The environmental assessment framework for assessment of impacts and the relevant criteria were applied to evaluate the significance of the potential impacts. A summary of the potential positive and negative impacts identified for the detailed design and construction, and operation phase are presented in Table A and Table B. A summary of the potential positive and negative cumulative social impacts identified for the project is provided in Table C.

Table A: Summary of potential social impacts identified for the detailed design and construction phase.

Impact	Significance Without Mitigation / Enhancement	Significance With Mitigation / Enhancement
Positive Impact		
Creation of direct and indirect employment and skills development opportunities.	Positive Low (22)	Positive Medium (36)
Economic multiplier effects	Positive Low (22)	Positive Medium (39)
Improvements to shared infrastructure	Positive (11)	Positive (26)
Negative Impacts		
Potential loss of productive farmland	Negative Medium (39)	Negative Low (20)
In-migration of people (non-local workforce and jobseekers).	Negative Medium (38)	Negative Low (17)
Safety and security impacts	Negative Medium (36)	Negative Low (18)
Impacts on daily living and movement patterns	Negative Medium (36)	Negative Low (20)
Nuisance impact (noise and dust)	Negative Medium (33)	Negative Low (20)
Potential impacts of increased risk of potential veld fires	Negative Medium (36)	Negative Low (18)
Visual and sense of place impacts	Negative Low (12)	Negative Low (9)

Table B: Summary of potential social impacts identified for the operation phase.

Impact	Significance Without Mitigation / Enhancement	Significance With Mitigation / Enhancement
Positive Impact		
Direct and indirect employment and skills development opportunities	Positive Low (15)	Positive Medium (36)
Development of non-polluting, renewable energy infrastructure	Positive Medium (36)	Positive Medium (36)
Contribution to LED and social upliftment	Positive Medium (48)	Positive High (72)
Potential impacts on tourism	Positive Low (24)	Positive Low (24)
Increased household earnings	Positive Low (16)	Positive Medium (32)
Negative Impacts		
Potential impacts on tourism	Negative Low (24)	Negative Low (24)
Impacts associated with the loss of agricultural land.	Negative Medium (30)	Negative Low (22)
Visual and sense of place impacts	Negative Low (28)	Negative Low (12)

Table C: Summary of potential cumulative social impacts identified for the project.

Cumulative Impact	Significance Without Mitigation / Enhancement	Significance With Mitigation / Enhancement
Positive Cumulative Impact		
Cumulative impact from employment, skills and business opportunities and skills development	Positive Medium (39)	Positive Medium (42)
Negative Cumulative Impacts		
Cumulative impact with large-scale in-migration of people	Negative Low (8)	Negative Medium (42)

There are some vulnerable communities within the project area that may be affected by the development of Naos Solar PV Project Two and its associated infrastructure. These communities may include the communities of Viljoenskroon as well as its surroundings. Traditionally, the construction phase of a PV solar development is associated with most social impacts. Many of the social impacts

are unavoidable and will take place to some extent but can be managed through the careful planning and implementation of appropriate mitigation measures. Several potential positive and negative social impacts have been identified for the project, however an assessment of the potential social impacts indicated that there are no perceived negative impacts that are sufficiently significant to allow them to be classified as “fatal flaws”.

Based on the social impact 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 solar PV projects (these relate to an influx of non-local workforce and jobseekers, intrusion, and disturbance impacts (i.e., noise and dust, wear and tear on roads) and safety and security risks) and could be reduced with the implementation of the mitigation measures proposed. The significance of such impacts on the local communities can therefore be mitigated.
- The development will introduce employment opportunities during the construction phase (temporary employment) and a limited number of permanent employment opportunities during operation phase.
- The proposed project could assist the local economy in creating entrepreneurial growth and opportunities, especially if local business is involved in the provision of general material, goods and services during the construction and operational phases. This positive impact is likely to be compounded by the cumulative impact associated with the development of several other solar facilities within the surrounding area, and because of the project’s location within an area which is characterised by high levels of solar irradiation, and which is therefore well suited to the development of commercial solar energy facilities.
- The proposed development also represents an investment in infrastructure for the generation of non-polluting, Renewable Energy, which, when compared to energy generated because of burning polluting fossil fuels, represents a positive social benefit for society.
- When considering Naos Solar PV Project Two, it is also important to consider the cumulative social impacts that may arise with other proposed solar PV projects in the area.
- It should be noted that the perceived benefits associated with the project, which include RE generation and local economic and social development, outweigh the perceived impacts associated with the project.

RECOMMENDATIONS

The following recommendations are made based on the SIA. The proposed mitigation measures should be implemented to limit the negative impacts and enhance the positive impacts associated with the project. Based on the social assessment, the following recommendations are made:

- The appointment of a CLO to assist with the management of social impacts and to deal with community issues, if feasible.
- It is imperative that local labour be sourced, wherever possible, to ensure that benefits accrue to the local communities. Efforts should be made to involve local businesses during the construction activities, where possible. Local procurement of labour and services / products would greatly benefit the community during the construction and operational phases of the project.

- Local procurement of services and equipment is required where possible to enhance the multiplier effect.
- Involve the community in the process as far as possible (encourage co-operative decision making and partnerships with local entrepreneurs).
- Employ mitigation measures to minimise the dust and noise pollution and damage to existing roads.
- Safety and security risks should be considered during the planning / construction phase of the proposed project. Access control, security and management should be implemented to limit the risk of crime increasing in the area.

CONCLUSION

The proposed project and associated infrastructure are unlikely to result in permanent damaging social impacts. From a social perspective it is concluded that the project could be developed subject to the implementation of recommended mitigation measures and management actions identified for the project.

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LIST OF ACRONYMS

AC	Alternating Current
BAR	Basic Assessment Report
B-BBEE	Broad-Based Black Economic Empowerment
BEE	Black Economic Empowerment
CLO	Community Liaison Officer
CPA	Communal Property Association
CSP	Concentrated Solar Power
DC	Direct Current
DEA	Department of Environmental Affairs (National)
DEAT	Department of Environmental Affairs and Tourism
DFFE	Department Forestry, Fisheries and the Environment
DMRE	Department of Mineral Resources and Energy
DM	District Municipality
EA	Environmental Authorisation
EAP	Economically Active Population
ECA	Environment Conservation Act (No. 73 of 1989)
ECO	Environmental Control Officer
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EP	Equator Principles
EPC	Engineering, Procurement and Construction
FGM	Focus Group Meeting
FMP	Fire Management Plan
GDP	Gross Domestic Product
I&APs	Interested and Affected Parties

IDP	Integrated Development Plan
IEP	Integrated Energy Plan
IFC	International Finance Corporation
IPP	Independent Power Producer
IRP	Integrated Resource Plan
IUCN	International Union for Conservation of Nature
GIS	Geographic Information System
km	Kilometre
kV	Kilovolt
LED	Local Economic Development
LM	Local Municipality
MW	Megawatt
NDP	National Development Plan
NEPCO	National Electrical Power Company
NEMA	National Environmental Management Act (No. 107 of 1998)
O&M	Operations and Maintenance
OHS	Occupational Health and Safety
PSDF	Provincial Spatial Development Framework
PV	Photovoltaic
RE	Renewable Energy
REDZ	Renewable Energy Development Zone
REIPPP	Renewable Energy Independent Power Producer Procurement Programme
SDF	Spatial Development Framework
SIA	Social Impact Assessment
ToR	Terms of Reference
UNESCO	United Nations Educational, Scientific and Cultural Organisation

1. INTRODUCTION

1.1. Project Background

Naos Solar PV Project Two (Pty) Ltd is proposing the development of the Naos Solar PV Project Two, a commercial Photovoltaic (PV) solar energy facility and associated infrastructure located on Portion 2 of the Farm Waterford No. 573, Free State Province. The proposed project is intended to form part of the Department of Mineral Resources and Energy (DMRE) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme, but the option also exists for other tenders, wheeling or to supply privately, without a generation license from NERSA, for up to 150MW. The REIPPP Programme aims to secure 14 725 Megawatts (MW) of new generation capacity from renewable energy sources, while simultaneously diversifying South Africa's electricity mix. According to the 2021 State of the Nation Address, Government will soon be initiating the procurement of an additional 11 800 MW of power from renewable energy, natural gas, battery storage and coal in line with the Integrated Resource Plan 2019 and fulfilling their commitments under the United Nations Framework Convention on Climate Change and its Paris Agreement which include the reduction of greenhouse gas emissions. Eskom, our largest greenhouse gas emitter, has committed in principle to net zero emission by 2050 and to increase its renewable capacity.

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The Social Impact Assessment (SIA) Report has been prepared by Donaway Environmental on behalf of Environamics and is intended to provide input into Basic Assessment Report (BAR) to be submitted to DFFE.

1.2. Project Description

Photovoltaic (PV) energy facilities make use of the sun's energy to generate electricity. This process is also better known as the "Photovoltaic Effect". The Photovoltaic Effect refers to the photon collision with electrons, placing the electrons into a higher state of energy to create electricity. A photovoltaic panel consists of the following components: The photovoltaic cells, the inverter, transformers, and support structure. The term photovoltaic describes a solid-state electronic cell that produces direct current electrical energy from the radiant energy of the sun through a process known as the Photovoltaic Effect. This refers to light energy placing electrons into a higher state of energy to create electricity. Each PV cell is made of silicon (i.e., semiconductors), which is positively and negatively charged on either side, with electrical conductors attached to both sides to form a circuit. This circuit captures the released electrons in the form of an electric current (direct current). The key components of the proposed projects are described below:

Based on a review of previous similar projects and the basic project information received for the purpose of this SIA, the scope of work and basic infrastructure that are inclusive of any ancillary activities and that can be associated with the proposed Naos Solar PV Project Two would include:

- PV Panel Array

To produce up to 200MW the proposed facility will require numerous linked cells placed behind a protective glass sheet to form a panel. Multiple panels will be required to form the solar PV arrays which will comprise the PV facility.

- Battery Energy Storage System (BESS)

The battery energy storage system will make use of Lithium-ion (Lithium Iron Phosphate / Sodium Sulphur) or Vanadium Redox technology and will have a capacity of up to 4.5GWh. The extent of the system will be ~4.59ha. It must be noted that should the facility layout not require the development and operation of a BESS, the area allocated for the placement of the BESS will be used for panel placement within the development footprint.

- Inverters

Sections of the PV array will be wired to inverters. The inverter is a pulse-width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency.

- Connection to the grid

Connecting the array to the electrical grid requires the transformation of the voltage from 33kV to 132kV. The normal components and dimensions of a distribution-rated electrical substation will be required. A collector substation with a capacity of 132kV will also be required.

The onsite substation will be required on each site to step the voltage up to 132kV, after which the power will be evacuated into the national grid via the new proposed power line from the proposed collector substation to the 400kV Mercury Main Transmission Substation (MTS).

The layout includes two collector substation alternative locations that must be assessed, and the preferred location indicated. The developer has also indicated specific internal power lines to connect the collector substation to the main grid connection corridor which will ultimately evacuate the generated power into the national grid. Should the three developments (i.e., Naos Solar PV Project One, Project two and Project Three) all be developed then there would be an overlap of the internal 132kV power lines that will be shared between the facilities to reduce the extent of linear infrastructure required).

It must be noted that for each respective project Collector Substation Option 1 is put forward as the technically preferred option for the respective project layouts.

The capacity of the collector substation for each project will be 132kV and the capacity of the internal power lines will be 132kV.

Refer to figure below:

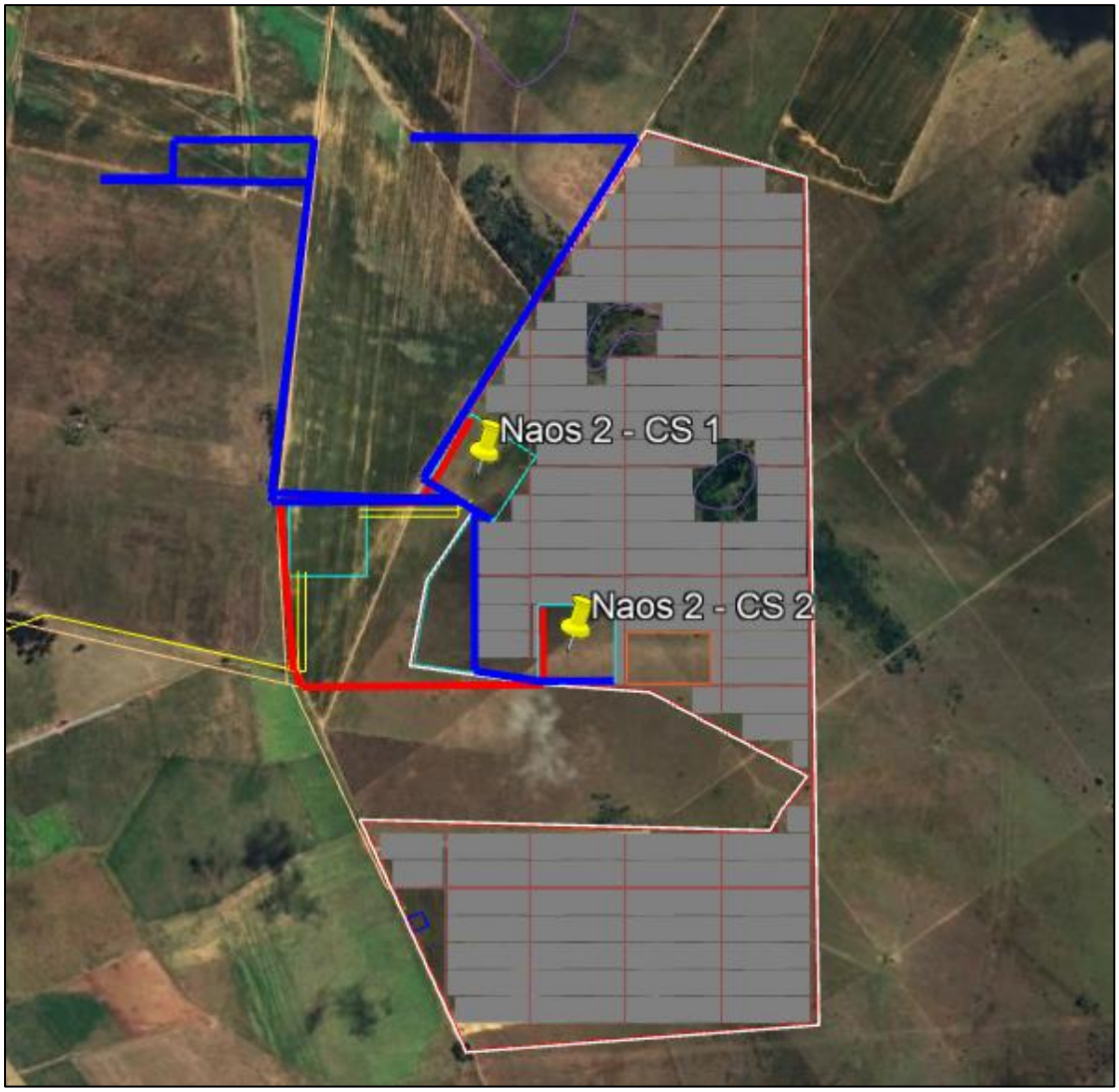


Figure 1.1: Internal grid connection solution, with two collector substation alternative locations, for Naos Solar PV Project Two (red lines = Naos 2 132kV Eskom power line connecting to the main grid connection corridor for each collector substation alternative, blue lines = Naos 1 & 3 132kV power lines crossing over the Naos Solar PV Project Two).

The power line route to connect each of the respective facilities to the 400kV Mercury Main Transmission Substation will be assessed within a 200m wide grid connection corridor. Six alternative routes are being considered.

Refer to the Figure below.

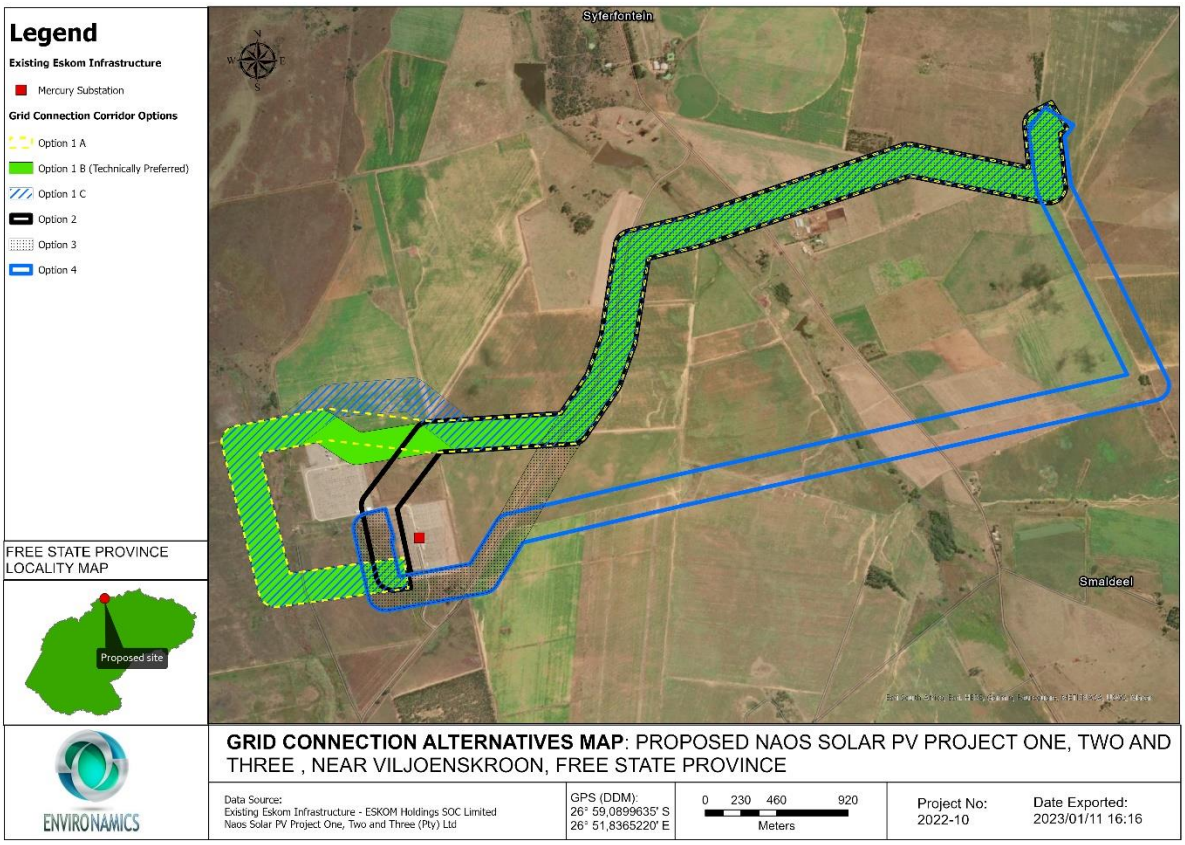


Figure 1.2: Six grid connection corridor alternatives proposed for the three Naos PV projects.

- Supporting Infrastructure

The following auxiliary buildings with basic services including water and electricity will be required on the sites for each project:

- Operations & Maintenance Building / Office (~2510m²)
- Switch gear and relay room (~800m²);
- Staff lockers and changing room (~200m²);
- Security control (~60m²);
- Permanent Laydown Area (~7ha) and
- Temporary batching plant

- Roads

Access will be obtained via the existing Vermaasdrift Road, R59, R501 and S643 roads. Four alternative main access routes are being considered (the preferred route will be determined by the local and / or national roads authorities during the site access permit approval process). An internal site road network will also be required to provide access to each respective solar field and associated infrastructure. Internal access roads will be up to 12m in width. The main access road providing direct access to the project will be up to 8m wide and 6km long.

- Fencing

For health, safety and security reasons, the facilities will be required to be fenced off from the surrounding farms. Each project will have permanent security on site for 24hrs per day, 7 days a week.

Table 1.1: Technical details for each the proposed facilities

Component	Description / dimensions
Height of PV panels	Up to 3 meters
Area of PV Array	Naos Solar PV Project Two: up to 300 ha (Development Footprint)
Number of inverters required	Number of String inverters: up to 1000 Number of Central inverters: up to 60 These are indicative numbers and are subject to change as part of the final facility layout design.
Area occupied by inverter / transformer stations / substations	String inverters (per item): 1 m^2 Central Inverters (per item): 20 m^2 Transformers (per item): 20 m^2 (included in the on-site substation) On-site Facility Substation: up to 2000 m^2 Collector Substation: up to 25000 m^2 BESS: ~4.59ha (Naos 2)
Capacity of the on-site substation	33kV / 132kV
Capacity of the collector substation	33kV / 132kV
Capacity of the power lines	33kV / 132kV
Area occupied by both permanent and construction laydown areas	~7ha
Area occupied by buildings	• Operations & Maintenance Building / Office (~2510m²) • Switch gear and relay room (~800m²); • Staff lockers and changing room (~200m²); • Security control (~60m²);
Length of internal roads	up to 16km
Width of internal roads	up to 12m
Length of internal power lines to connect the collector substations	Naos Solar PV Project Two: up to 4km
Grid connection corridor width	200m
Grid connection corridor length – for main power line connecting to the Mercury MTS	Power Line Alternative 1A – up to 8km Power Line Alternative 1B (technically preferred) – up to 8km Power Line Alternative 1C – up to 8km Power Line Alternative 2 – up to 7km Power Line Alternative 3 – up to 7km Power Line Alternative 4 – up to 7.5km

Power line servitude width	Up to 32m
Height of fencing	Approximately 3 meters

1.3. Consideration of Alternatives

The DEAT 2006 guidelines on 'assessment of alternatives and impacts' proposes the consideration of four types of alternatives namely, the no-go, location, activity, and design alternatives. It is however important to note that the regulation and guidelines specifically state that only 'feasible' and 'reasonable' alternatives should be explored. It also recognizes that the consideration of alternatives is an iterative process of feedback between the developer and EAP, which in some instances culminates in a single preferred project proposal. An initial site assessment was conducted by the developer the affected properties and the farm portions were found favorable due to its proximity to grid connections, solar radiation, ecology and relative flat terrain. These factors were then taken into consideration and avoided as far as possible.

The following alternatives were considered in relation to the proposed activity:

- No-go alternative

This alternative considers the option of 'do nothing' and maintaining the status quo. The site is currently zoned for agricultural land uses. Should the proposed activity not proceed, the site will remain unchanged and will continue to be used for agricultural purposes. The potential opportunity costs in terms of alternative land use income through rental for energy facility and the supporting social and economic development in the area would be lost if the status quo persist.

- Location alternatives

No other possible sites were identified on the affected property(ies) for the developments. This site is referred to as the preferred site. Some limited sensitive features occur on the site. The size of the site makes provision for the exclusion of any sensitive environmental features that may arise through the BA process to enable the appropriate placement of the infrastructure within the development footprint.

- Technical alternatives: Grid Connection

Connecting the array to the electrical grid requires transformation of the voltage from 33kV to 132kV. The normal components and dimensions of a distribution-rated electrical substation will be required. A collector substation with a capacity of 132kV will also be required.

The onsite substation will be required on each site to step the voltage up to 132kV, after which the power will be evacuated into the national grid via the new proposed power line from the proposed collector substation to the 400kV Mercury Main Transmission Substation (MTS).

The layout includes two collector substation alternative locations that must be assessed, and the preferred location indicated. The developer has also indicated specific internal power lines to connect the collector substation to the main grid connection corridor which will ultimately evacuate the generated power into the national grid. Should the three developments (i.e., Naos Solar PV Project One, Two and Three) all be developed then there would be an overlap of the internal 132kV power lines that will be shared between the facilities to reduce the extent of linear infrastructure required).

It must be noted that for each respective project Collector Substation Option 1 is put forward as the technically preferred option for the respective project layouts.

The capacity of the collector substation for each project will be 132kV and the capacity of the internal power lines will be 132kV.

The lengths of the internal lines per project are as follows:

- Naos Solar PV Project two: up to 4km

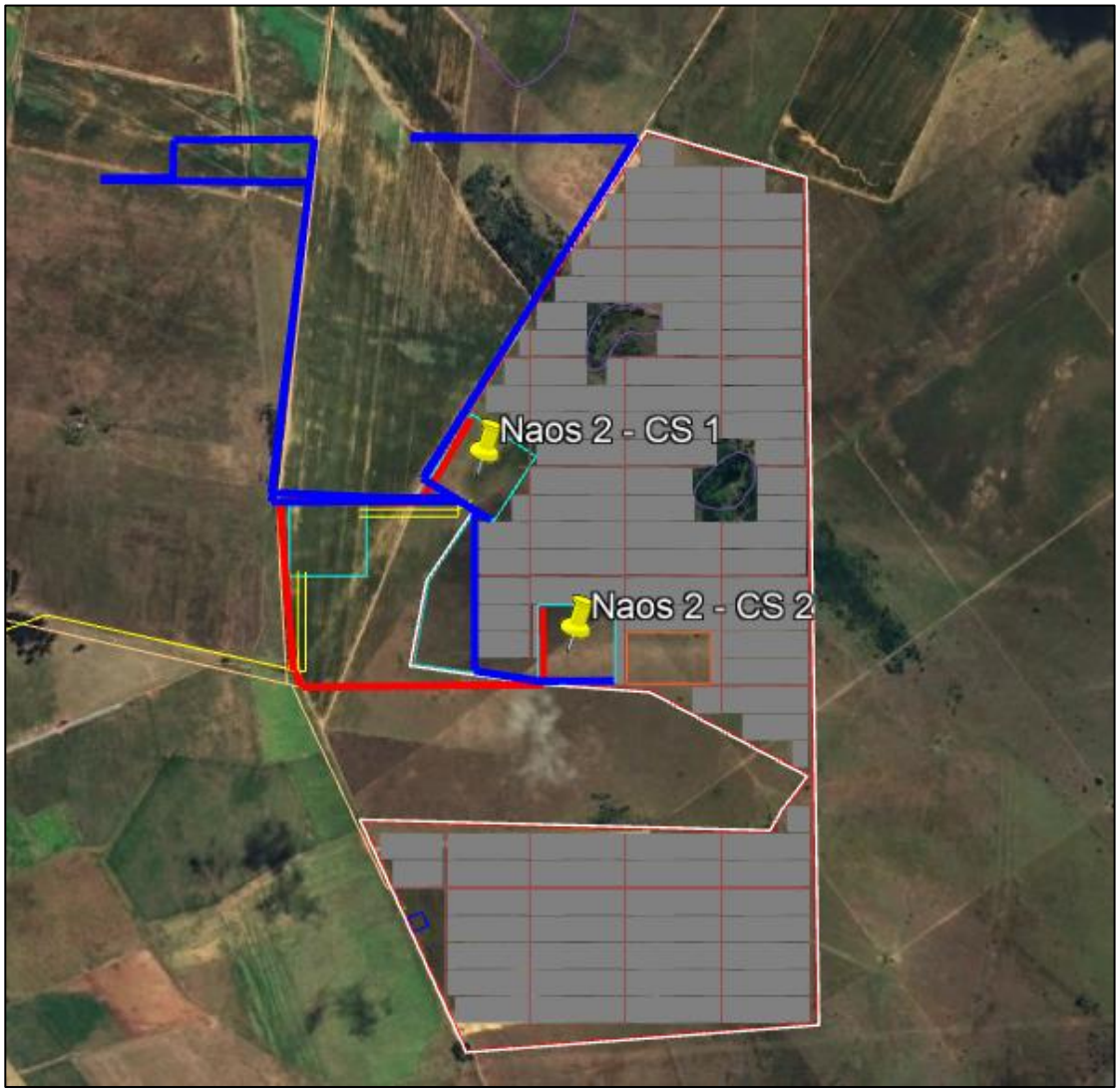


Figure 1.3: Internal grid connection solution, with two collector substation alternative locations, for Naos Solar PV Project Two (red lines = Naos 2 132kV Eskom power line connecting to the main grid connection corridor for each collector substation alternative, blue lines = Naos 1 & 3 132kV power lines crossing over the Naos Solar PV Project Two).

The power line route to connect each of the respective facilities to the 400kV Mercury Main Transmission Substation will be assessed within a 200m wide grid connection corridor. Six alternative routes are being considered. Refer to the figure below:

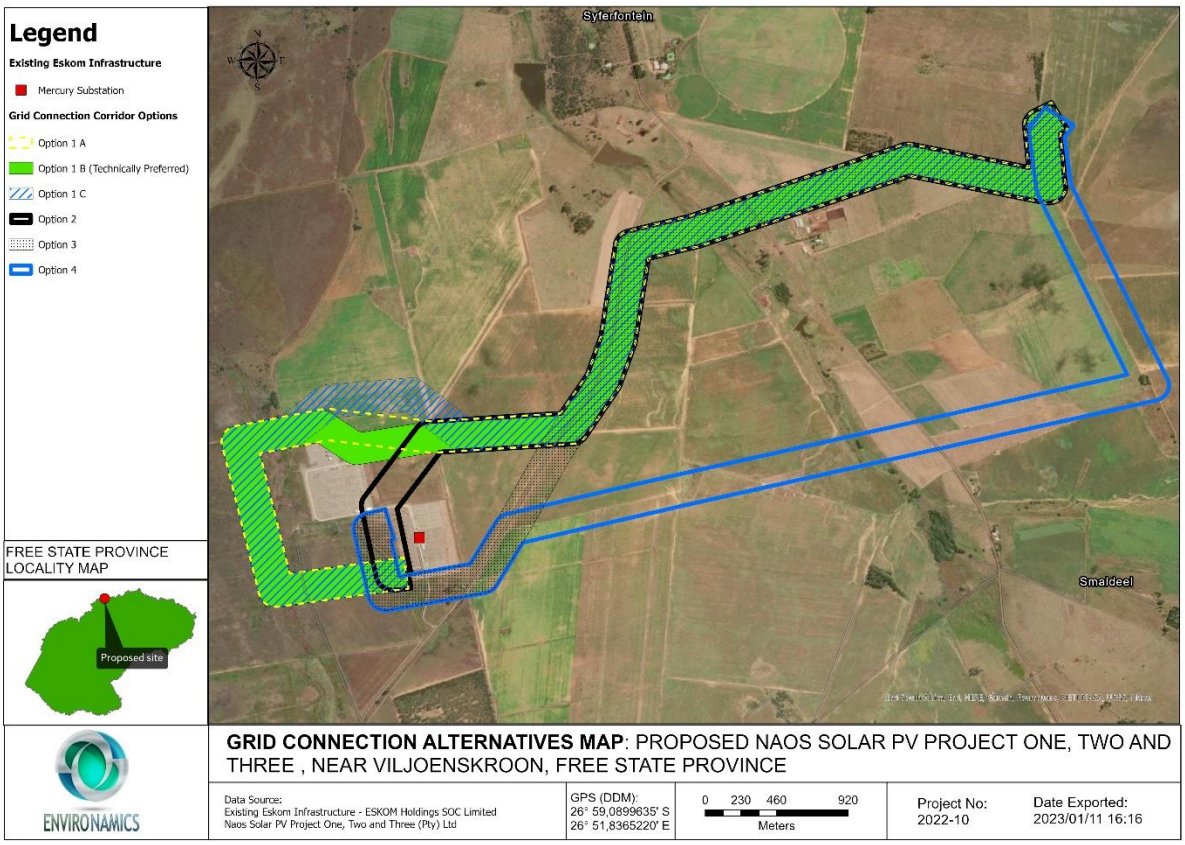


Figure 1.4: Six grid connection corridor alternatives proposed for the three Naos PV projects.

The lengths of the six power line alternatives are as follow:

- Power Line Alternative 1A – up to 8km
- Power Line Alternative 1B (technically preferred) – up to 8km
- Power Line Alternative 1C – up to 8km
- Power Line Alternative 2 – up to 7km
- Power Line Alternative 3 – up to 7km
- Power Line Alternative 4 – up to 7.5km

- Technical alternatives: Main Access

In order to gain access to the site four alternative main access routes are being proposed for the development. These include the following:

- Preferred Access Road (Main Road) - 12.6km
- Alternative 1 – 25.6km
- Alternative 2 – 27.5km
- Alternative 3 – 14.6km

The Preferred Access Road (Main Road) follows the S643, where it then crosses over the Vaal River via the Vermaasdrift Bridge and provides direct access to the projects via an existing gravel farm road. Upgrading of sections of the road to accommodate the construction traffic will be undertaken where required. This route is considered to be the shortest route to the site from the R502 regional road and is therefore considered to be the ideal route for the delivery of equipment.

Alternative 1 provides access to the sites from the south via the R76 regional road, which connects to a gravel farm road which further leads to the existing Vermaasdrift Road. This road is ideal for the delivery of equipment and specifically the transformers. Upgrading of sections of the road to accommodate the construction traffic will be undertaken where required.

Alternative 2 provides access to the sites from the south via the R76 regional road, which connects to a gravel farm road which provides direct access to the sites. This road is ideal for the delivery of equipment and specifically the transformers. Upgrading of sections of the road to accommodate the construction traffic will be undertaken where required.

Alternative 3 provides access to the sites from the west via the R76 regional road, which connects to a gravel farm road which crosses over the existing Vermaasdrift Road and provides direct access to the sites. This road is ideal for the delivery of equipment and specifically transformers. Upgrading of sections of the road to accommodate the construction traffic will be undertaken where required, and a section of new road of about 5km long and 8m wide will need to be undertaken.

The preferred alternatives are the use of the Main Road and Alternative 2 collectively for the projects as these two options provide the most technically sensible solution for the transportation of goods and services to and from the sites. It is therefore requested that the Main Road and Alternative 2 both be authorised for the developments.

Refer to the Figure below.

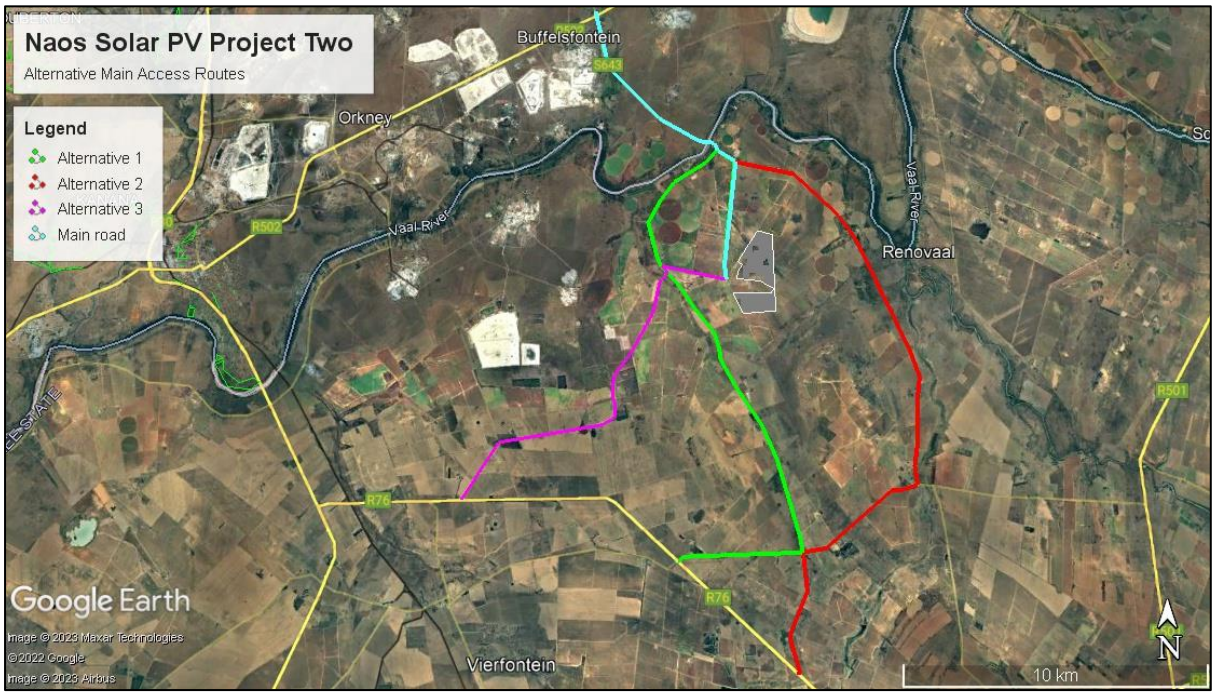


Figure 1.5: Main access route alternatives for the proposed Naos Solar PV Project Two.

- Design and layout alternatives

Design alternatives will be considered throughout the planning and design phase and specialist studies are expected to inform the final layout of the proposed development.

- Technology alternatives

There are several types of semiconductor technologies currently available and in use for PV solar panels. Two, however, have become the most widely adopted, namely crystalline silicon (Mono-facial and Bi-facial) and thin film. The technology that (at this stage) proves more feasible and reasonable with respect to the proposed solar facility is crystalline silicon panels, due to it being non-reflective, more efficient, and with higher durability. However, due to the rapid technological advances being made in the field of solar technology the exact type of technology to be used, such as bifacial panels, will only be confirmed at the onset of the project.

In terms of the type of panel to be installed, the panels will either be fixed tilt or tracking (single axis / dual axis).

1.4. EIA Regulations

The EIA Regulations No. 326, 327, 324 and 325 (as amended in 2017) promulgated in terms of Section 24(5) and 44 of the National Environmental Management Act, (107 of 1998) determine that an EIA process should be followed for certain listed activities, which might have a detrimental impact on the environment. According to Regulation No. 326 the purpose of the Regulations is: *"…to regulate the procedure and criteria as contemplated in Chapter 5 of the Act relating to the preparation, evaluation, submission, processing and consideration of, and decision on, applications for environmental authorisations for the commencement of activities, subjected to environmental impact assessment, in order to avoid or mitigate detrimental impacts on the environment, and to optimise positive environmental impacts, and for matters pertaining thereto*".

The EIA Regulations No. 324, 325 and 327 outline the activities for which EIA should apply. The following activities with special reference to the proposed activity are listed in the EIA Regulations:

Table 1.2: Listed activities

Relevant notice:	**Activity No (s)**	**Description of each listed activity as per project description**:
GNR. 327 (as amended in 2017)	Activity 11(i)	• *"The development of facilities or infrastructure for the transmission and distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts."* • Activity 11(i) is triggered as the proposed photovoltaic solar facility will transmit and distribute electricity of 132 kilovolts outside an urban area.
GNR. 327 (as amended in 2017)	Activity 14	• *"The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres."* • Activity 14 is triggered as hazardous goods (including diesel, petrol, oils, hydraulic oil, paints, grease and

		sealants) will need to be stored for the project with a combined capacity of more than 80 cubes but less than 500 cubes. It is planned that storage for 100 cubes of hazardous goods will need to be stored and handled.
GNR. 327 (as amended in 2017)	Activity 24 (ii)	• *"The development of a road (ii) with reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 meters."* • Activity 24 (ii) is triggered as internal and external roads will be developed and will have a width of approximately 8 m, but up to 12m.
GNR. 327 (as amended in 2017)	Activity 28(ii)	• *"Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare."* • Activity 28(ii) is triggered as portions of the affected farm has been previously used for agricultural activities and the property will be re-zoned to "special" use.
GNR. 327 (as amended in 2017)	Activity 56 (ii):	• *"The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (ii) where no reserve exists, where the existing road is wider than 8 metres…"* • Activity 56 (ii) is triggered as the existing access to the affected property does not have a reserve and will need to be widened by more than 6 metres.
GNR. 325 (as amended in 2017)	Activity 1	• *"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more."* • Activity 1 is triggered since the proposed photovoltaic solar facility will generate up to 240 megawatts of electricity through the use of a renewable resource.
GNR. 325 (as amended in 2017)	Activity 15	• *"The clearance of an area of 20 hectares or more of indigenous vegetation."* • More than 20 hectares of indigenous vegetation will be cleared. The development footprint will be over 300 hectares in extent.

The activities triggered under Listing Notice 1 & 2 (Regulation 327 & 325) for the project implies that the developments are considered as potentially having an impact on the environment and therefore require the implementation of appropriate mitigation measures. The project is located in the Klerksdorp Solar Renewable Energy Development Zone. Therefore, the project is subject to a Basic Assessment process, as well as the 57-day timeframe for the processing of the Application for Environmental Authorisation by the Department of Forestry, Fisheries and the Environment (DFFE).

1.5. Terms of Reference

The terms of reference (TOR) in an SIA according to Barbour (2007:28) should indicate how and to what extent the SIA specialist should be involved for the purpose and scale of the proposed intervention. The TOR as provided and agreed upon with Environamics include the following:

Specialists in their field of expertise will consider baseline data and identify and assess impacts according to predefined rating scales. Specialists will also suggest optional or essential ways in which to mitigate negative impacts and enhance positive impacts. Further, specialists will, where possible, take into consideration the cumulative effects associated with this and other projects, which are either developed or in the process of being developed in the local area. The results of these specialist studies will be integrated into the BAR for comments and final submissions to all Interested and Affected Parties (I&APs) and DFFE. The Terms of Reference (ToR) or general requirements proposed for the inputs are listed below:

<u>General Requirements:</u>

Specialists' reports must comply with Appendix 6 of GNR326 published under sections 24(5), and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and whereby the following are to be included:

- The details of the specialist who prepared the report and the expertise of that specialist to compile a specialist report including a curriculum vitae.
- A declaration that the specialist is independent in a form as may be specified by the competent authority.
- An indication of the scope of, and the purpose for which, the report was prepared.
- The date and season of the site investigation and the relevance of the season to the outcome of the assessment.
- A description of the methodology adopted in preparing the report or carrying out the specialised process; the specific identified sensitivity of the site related to the activity and its associated structures and infrastructure.
- An identification of any areas to be avoided, including buffers.
- A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers.
- A description of any assumptions made and any uncertainties or gaps in knowledge.

- A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment.
- Any mitigation measures for inclusion in the EMPr;
- Any conditions for inclusion in the environmental authorisation.
- Any monitoring requirements for inclusion in the EMPr or environmental authorisation.
- A reasoned opinion as to whether the proposed activity or portions thereof should be authorised, and if the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan.
- A description of any consultation process that was undertaken during the course of preparing the specialist report.
- A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and
- Any other information requested by the competent authority.

In addition to the above, specialists are expected to:

- Review the Basic Assessment Report (BAR), with specific reference to the Comments and Response Report to familiarize with all relevant issues or concerns relevant to their field of expertise.
- In addition to the impacts listed in the BAR, identify any issue or aspect that needs to be assessed and provide expert opinion on any issue in their field of expertise that they deem necessary in order to avoid potential detrimental impacts.
- Assess the degree and extent of all identified impacts (including cumulative impacts) that the preferred project activity and its proposed alternatives, including that of the no-go alternative, may have.
- Identify and list all legislation and permit requirements that are relevant to the development proposal in context of the study.
- Reference all sources of information and literature consulted; and
- Include an executive summary to the report.

The terms of reference for this SIA requires to provide the following:

- Provide a description of the environment that may be affected by the activity and the way the environment may be affected by the proposed facility.
- Provide a description and assessment of the potential social issues associated with the proposed facility; and

- Identify enhancement and mitigation aimed at maximizing opportunities and avoiding and or reducing negative impacts.

The key activities in the SIA process as embodied in the Western Cape Department of Environmental Affairs and Development Planning Guidelines for Social Impact Assessment (February 2007) will include:

- Describing and obtaining an understanding of the proposed intervention (type, scale, location), the communities likely to be affected and determining the need and scope of the SIA.
- Collecting baseline data on the current social environment and historical social trends.
- Identifying and collecting data on the Social Impact Assessment variables and social change processes related to the proposed intervention. This requires consultation with affected individuals and communities.
- Assessing and documenting the significance of social impacts associated with the proposed intervention; and
- Identifying alternatives and mitigation measures.

In this regard the study should involve:

- Review of demographic data from the Census Survey.
- Review of relevant planning and policy frameworks for the area.
- Site specific information collected during the site visits to the area and interviews with key stakeholders.
- Review of information from similar projects; and
- Identification of social issues associated with the proposed project.

1.6. Project Team and Experience

The project team will consist of Johan Botha and Yolandie Botes.

Johan Botha graduated with an Honours degree in 2011 from the North West University in the field of Environmental Sciences specialising in Geography and Environmental Management and has since been involved in the environmental management of substations, powerlines and solar PV plants together with over 100+ Visual Impact Assessments (VIA) and 50+ Social Impact Assessments (SIA), mostly in the field of Renewable Energy. All the above-mentioned experience accumulated the necessary skills to conduct visual and social impact assessments.

Yolandie Botes Graduated with a master's degree in Environmental Science from the North West University in 2021 with special focus on research in SIAs in the Renewable energy sector of South Africa.

2. METHODOLOGY

2.1. Purpose of the Study

Social Impact Assessments are defined by International Principles as: "The processes of analysing, monitoring, and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by those interventions".

The International Principles for Social Impact Assessment define social impacts as changes to one or more of the following:

- People's way of life – that is, how they live, work, play and interact with one another on a day-to-day basis.
- Their culture – that is, their shared beliefs, customs, values and language or dialect.
- Their community – its cohesion, stability, character, services, and facilities.
- Their political systems – the extent to which people can participate in decisions that affect their lives, the level of democratisation that is taking place, and the resources provided for this purpose.
- Their environment – the quality of the air and water people use, the availability and quality of the food they eat, the level of hazard or risk, dust, and noise they are exposed to, the adequacy of sanitation, their physical safety, and their access to and control over resources.
- Their health and wellbeing – health is a state of complete physical, mental, social and spiritual wellbeing and not merely the absence of disease or infirmity,
- Their personal and property rights – particularly whether people are economically affected or experience personal disadvantage which may include a violation of their civil liberties.
- Their fears and aspirations – their perceptions about their safety, their fears about the future of their community, and their aspirations for their future and the future of their children.

The purpose of this SIA Report is therefore to:

- Provide baseline information describing the social environment within which the project is proposed, and which may be impacted (both positively and negatively) because of the proposed development.
- Identify, describe, and assess possible social risks / fatal flaws and social impacts that may arise as a result of the proposed development (in terms of the detailed design and construction, operation, and decommissioning phases of the project).
- Recommend ways in which negative impacts can be avoided, minimised, or their significance reduced, and positive impacts maximised or enhanced.

2.2. Approach to the Study

The research approach followed for the development of an SIA study is based on the Guidelines for Involving Social Impact Assessment Specialists in the BA process that was prepared for the Department of Environmental Affairs and Development Planning for the Western Cape Province of South Africa in February 2007. These guidelines for development and planning of Social Impact

Assessments (SIA) are based on international best practice guidelines. The key components of the SIA process which are embodied in these guidelines include:

- Describe and obtain a basic understanding of the proposed development (type, scale and location). Also obtain an understanding of the individuals and/or communities which are likely to be affected by the intervention, and determine the need and the scope of conducting and SIA;
- Collecting the baseline data for the proposed intervention based on the current social environment and historical social trends;
- Assess and document the significance of the social impacts which are associated with the proposed intervention; and
- Based on the baseline data and the identification and assessment of the social impacts likely to be associated with the proposed intervention, identify alternatives and mitigation measures for the social impacts of the proposed intervention (Barbour, 2007).

The research approach to this study is similar to scientific social research methods. A literature review was conducted to define and gain a basic understanding of the key concepts.

Vanclay (2003) described social change processes as a very discreet, describable, and observable process, which changes the characteristics of a society. These processes are set in motion by different project interventions and or development policies. If these changes are managed effectively, it may not create impacts, but depending on the context, these social change processes might lead the social impact on a community. Examples of such social processes include the increase of population, the influx of temporary workers, relocation of communities etc. According to Vanclay (2002) the term "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". It is important to note that social impacts can vary in both space and time. Social impacts can also differ in the way people differ from gender, culture, religion, ethnicity and in general how they view the world. This is better known as the social construct of reality and refers to people's worldview and the way they react to impacts and changes.

The term "Social Impact Assessment" refers to the efforts to analyse, monitor and manage, in advance, the unintended and intended social consequences, positive or negative, which are likely to follow from proposed interventions, policies and/or programmes (IAIA, 2003; Vanclay 2006). The objective of an SIA is to identify the intended as well as the unintended effects of planned interventions to achieve sustainable development (Hildebrandt, 2014). Esteves and Vanclay (2009:140) and Hildebrandt (2014) go further by stating that SIA should be seen as an umbrella assessment, which incorporates the evaluation of all impacts on people and on all the ways in which people interact with their socio-cultural, biophysical, and economic surroundings.

This research study made use of a qualitative research approach. A qualitative research approach answers questions about the complex nature of a phenomenon. The aim of this approach is to describe and understand the phenomena from a participants' point of view (De Vos et al., 2011). This

research approach mainly relies on converting information from observations, reports, and recordings into data and then into the written word.

This study followed the research approach similar to the components identified above. The steps involved in the research approach for this study involved:

- Collection and review of existing information, including national, provincial, district, and local plans, policies, programmes, Census data, and available literature from previous studies conducted within the area. Project specific information was obtained from the project proponent (Naos Solar PV Project Two) and the Environmental Consultant (Environamics).
- Collection of primary data during a site visit. Telephone Interviews were conducted with directly affected landowners and key stakeholders (Ward Councillors and business owners located in towns where similar projects have to gain their inputs on the project and its perceived social impacts and benefits on the affected community.
- Identification of potential direct, indirect and cumulative impacts likely to be associated with the construction, operation, and decommissioning of the proposed project.
- Where applicable mitigation measures with which to minimise impacts and enhance benefits associated with the project were identified.
- Preparation of an SIA Report and inputs into the Environmental Management Programme (EMPr) to be prepared for the project.

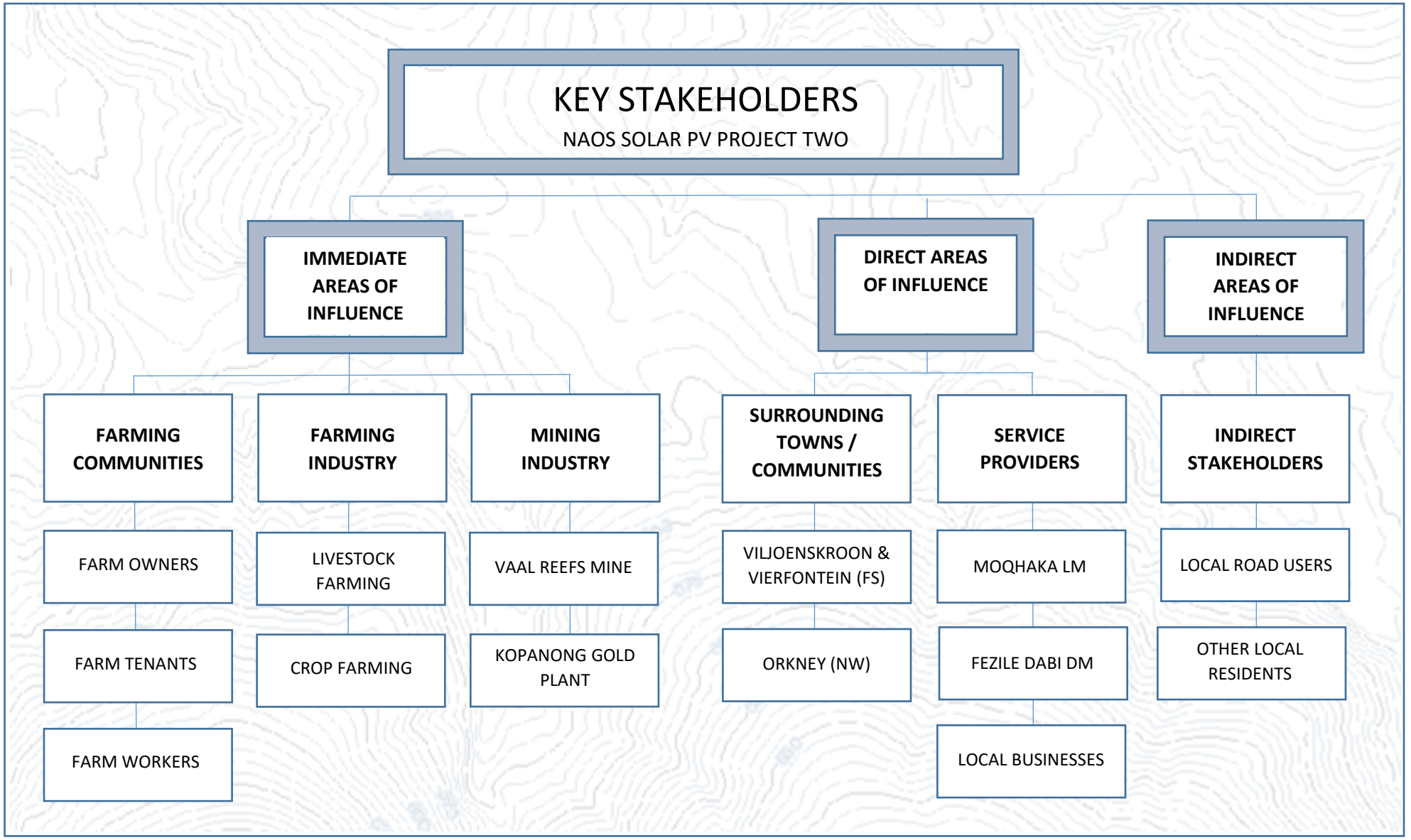
The identification of the potential social issues associated with the proposed intervention is based on the review of relevant documentation, experience from previous projects and the observations during the project site visits. Table 2.1 includes the list of the farmers with which interviews were held. The methodology used to assign the significance ratings to the assessment process will be discussed below.

2.2.1. Stakeholder Identification and Analysis

Stakeholders are defined as: “Any group or organisation which may affect or be affected by the issue under consideration” (UN, 2001:26).

These groups may be directly or indirectly impacted and can include organisations, institutions, communities, or individuals. Any position in society can be impacted, from international, national, regional, household level etc. (Franke and Guidero, 2021).

Stakeholder analysis involves the identification of affected or impacted people and their key grouping and sub-groupings (IFC, 2007). Identifying stakeholders that are directly and indirectly affected by the project is important to determine who might be impacted by the development and in what way. The key stakeholders in the proposed project have been identified, grouped / sub-grouped and described as per Ilse Aucamp’s SIA methodology (Aucamp et al, 2011). There are immediate, direct, and indirect areas of influence to the proposed development. Affected stakeholders comprise sensitive social receptors that may potentially be affected by the proposed development based on their location.


KEY STAKEHOLDERS
NAOS SOLAR PV PROJECT TWO
IMMEDIATE AREAS OF INFLUENCE
DIRECT AREAS OF INFLUENCE
INDIRECT AREAS OF INFLUENCE
FARMING COMMUNITIES
FARMING INDUSTRY
MINING INDUSTRY
SURROUNDING TOWNS / COMMUNITIES
SERVICE PROVIDERS
INDIRECT STAKEHOLDERS
FARM OWNERS
FARM TENANTS
FARM WORKERS
LIVESTOCK FARMING
CROP FARMING
VAAL REEFS MINE
KOPANONG GOLD PLANT
VILJOENSKROON & VIERFONTEIN (FS)
ORKNEY (NW)
MOQHAKA LM
FEZILE DABI DM
LOCAL BUSINESSES
LOCAL ROAD USERS
OTHER LOCAL RESIDENTS

A description of each of the stakeholder's groups in relation to Naos Solar PV Project Two is discussed below:

- **Farming Community**: The farming community can be grouped into three categories, namely farm owners, farm tenants, and farm workers. Farm owners comprise individuals who own the property and, in most cases, make a living off their properties. Farm tenants are people who rent land and work on the land to earn an income. Farm workers are people who work, and often reside on the farm with their families and are seen as a vulnerable community. Impacts that may arise for the farming community include impacts on (and the potential loss of) agricultural land and infrastructure, potential nuisance impacts (as a result of dust and noise specifically during construction), safety and security impacts (as a result of an in-migration of people in search of employment opportunities), impacts on the area's sense of place (as a result of a change in land use), visual impacts (as a result of construction equipment and activities and the presence of the PV facility infrastructure), cultural and social changes (also as a result of an in-migration of people in search of employment opportunities and a change in land use), and additional traffic and road safety impacts (as a result of the movement of construction equipment and personnel).

- **Farming industry:** The primary agricultural activity in the study area is livestock farming. Impacts that may arise as a result of the project include stock theft and poaching from an increase of people in the area (especially during the construction phase), impacts on current farming practices such as dust impacts which could affect grazing areas (especially during the construction phase), and potential loss of agricultural land as a result of the direct occupation of the land by the proposed facility and its associated infrastructure, which would remove the development footprint from agricultural production and threaten food security. Noise and movement of people may also negatively impact on farming operations.

- **Surrounding towns / affected communities:** The closest town to the project is Orkney and Viljoenskroon. Orkney is about 24km to the South West of the proposed site. Viljoenskroon is located approximately 24km South of the proposed development and is located in the same municipality as the proposed PV Plant. Residents within these towns may be positively and /or negatively impacted by the proposed development. Employment opportunities will become available as a result of the construction and operation of the proposed development, and it is probable that a portion of the labour force required for the project will be sourced from (and accommodated within) these towns, which will present a positive impact for the local community. In addition, contributions to Social Development of the local communities in terms of the DMREs requirements under the REIPPP Programme will result in local upliftment and positive impacts.

- **Service providers:** Major service providers that will be affected by the project include the Moqhaka LM, Fezile Dabi DM, and local businesses in the area. The Moqhaka LM, and to a lesser extent the Fezile Dabi DM are likely to be impacted by the proposed development. The Moqhaka LM is a Category B municipality, meaning that it shares municipal executive and legislative authority in its area with the Category C municipality within whose area it falls (i.e., the Fezile Dabi DM). The Moqhaka LM will absorb a number of positive and negative social

impacts in the form of employment creation, increased local expenditure, and increased revenue etc., as well as potential negative impacts in the form of an in-migration of people and increased pressure being placed on local services. Local businesses within the area could benefit from the proposed project in terms of an increase in demand for goods and services associated with the project.

- **Stakeholders outside the direct area of influence:** There are a number of stakeholders that reside outside the direct area of influence but who may also be impacted by the project. These include road users that utilise the Vermaasdrift, R59, R501 and S643 roads and local gravel roads adjacent to the site, on a frequent basis as part of their daily or weekly movement patterns. Construction vehicles and trucks will utilise these roads during construction, which will result in increased traffic, which may create traffic disruptions, and which may increase the wear and tear on these roads.

2.2.2. Collection and Review of Existing Information

Existing desktop information which has relevance to the proposed project, project site, and surrounds was collected and reviewed. The following sources of information were examined as part of this process:

- Project maps and layouts.
- Google Earth and Google Maps imagery.
- A description of the project (as provided by the project proponent).
- Information regarding employment, social upliftment, and local economic development opportunities (as provided by the project applicant).
- Census data (2011), and the Local Government Handbook (2018).
- Planning documentation such as Provincial Growth and Development Strategies (PGDSs), LM and DM
- Integrated Development Plans (IDPs), Spatial Development Frameworks (SDFs), and development goals and objectives. Relevant legislation, guidelines, policies, plans, and frameworks.
- Available literature pertaining to social issues associated with the development and operation of solar PV projects and associated infrastructure.

2.2.3. Collection of Primary Data

Telephone interviews were conducted with affected landowners and key stakeholders identified within the area. Details of individuals interviewed are provided in Table 2.1 below:

Table 2.1: Overview of individuals interviewed

Representative	Interest
Carl Crous	Landowner, Adjacent Landowner (North & North West & East)
Cobus Botah	Adjacent Landowner (South & South East)
Hannes Ollweagen (Spokesperson)	Adjacent Landowner (South West)
Gerrit Botha	Adjacent Landowner (South West)
Wawielpark Holidag Resort	I&AP

Clementia Function & Conference Venue	I&AP
Seekoeigat camping site	I&AP

During the interviews, interviewees were provided with background on the proposed project, and the BA and public participation process being undertaken in support of the application for EA. Interviewees were then interviewed utilising a questionnaire to determine their perceptions, interests, and concerns regarding the project.

The Moqhaka LM and Fezile Dabi DM are being engaged and their comments obtained as part of the BA process being undertaken for the project.

2.3. Baseline Assessment – Significance Rating

Impact assessment must take account of the nature, scale and duration of impacts on the social environment and whether such impacts are positive or negative. Each impact is also assessed according to the social receptors and the following project phases:

- Construction;
- Operation; and
- Decommissioning.

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance should also be included. The rating system is applied to the potential impacts on the receiving social receptors and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each impact, Table 2.2 below, will be utilised as the baseline impact assessment for each social receptor and phases of the project.

Table 2.2: Impact Significance Rating

NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be experienced.		
1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
PROBABILITY		
This describes the chance of occurrence of an impact.		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).

2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
DURATION		
This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.
INTENSITY/ MAGNITUDE		
Describes the severity of an impact.		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely

		impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired. Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
REVERSIBILITY		
This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible, and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible cumulative impact	The impact would result in negligible to no cumulative effects.
2	Low cumulative impact	The impact would result in insignificant cumulative effects.
3	Medium cumulative impact	The impact would result in minor cumulative effects.

4	High cumulative impact	The impact would result in significant cumulative effects

SIGNIFICANCE

Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula: (Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.

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

Points	Impact significance rating	Description
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive effects.

2.4. Assumptions and Limitations

This section of the report briefly describes the assumptions and limitations for this SIA study.

2.4.1. Limitations

- Data available within the 2011 Census, Free State Provincial Spatial Development Framework (PSDF) 2012, Fezile Dabi DM Reviewed Draft Integrated Development Plan (IDP) 2021 – 2022 (2021), Moqhaka Spatial Development Framework 2019/2020 (SDF) (2018), and the Moqhaka LM Final IDP 2021-2022 (2021) was used to generate the majority of information provided in

the baseline profile of the study area. The possibility therefore exists that the data utilised may be out of date and may not provide an accurate reflection of the current status quo.

- This SIA Report was prepared based on information which was available to the specialist at the time of preparing the report. The sources consulted are not exhaustive, and the possibility exists that additional information which might strengthen arguments, contradict information in this report, and / or identify additional information might exist. Additional information available from the public participation undertaken during the BA Process will be included within the final report, where relevant.
- Some of the project projections reflected in this SIA Report (i.e., with regards to job creation and local content) are based on information currently available and may be subject to change, and therefore may be higher or lower than those estimated by the project proponent.

2.4.2. Assumptions

The first assumption identified is the strategic importance of promoting renewable energy like solar energy. This however is supported by the national and provincial policies discussed in Section 3 of this report. In addition to this the fit with key planning and policy documents is a key component of the SIA process, in order to identify and assess the potential social impacts of the development. In the case where the findings of this review reflect that the proposed development does not conform to the related policy documents, then the proposed development can't be supported. However, as indicated above this proposed study does recognise the strategic importance of promoting solar energy. Secondly, it is assumed that the proposed development site for the Naos Solar PV Project Two is technically suitable for the establishment thereof.

Lastly, it is also assumed that the motivation for, and planning and feasibility study of the project were undertaken with integrity, and that information provided by the project proponent was accurate and true at the time of preparing this SIA Report.

3. LEGISLATION AND PLOICY REVIEW

The legislative and policy context applicable to a project plays an important role in identifying and assessing the potential social impacts associated with the development. In this regard a key component of the SIA process is to assess a proposed development in terms of its suitability with regards to key planning and policy documents.

The following key pieces of documentation were reviewed as part of this legislation and policy review process:

National Policy and Planning Context:

- Constitution of the Republic of South Africa (1996)
- National Environmental Management Act (No. 107 of 1998) (NEMA)
- White Paper on the Energy Policy of the Republic of South Africa of (1998)
- White Paper on Renewable Energy of (2003)
- The National Energy Act no 34 of (2008)
- Integrated Energy Plan (IEP) (2016)
- Integrated Resource Planning for Electricity for South Africa of 2010-2030 (2019)
- National Development Plan (NDP) of 2030 (2012)
- National Infrastructure Plan of South Africa (2012)
- Strategic Infrastructure Projects (SIPs)
- New Growth Path Framework (2010)
- 2021 State of the Nation Address

Provincial Policy and Planning Context:

- Free State Provincial Spatial Development Framework (PSDF) (2012)

District Level Policy and Planning Context:

- Fezile Dabi DM Reviewed Draft Integrated Development Plan (IDP) 2021 – 2021 (2021)

Local Policy and Planning Context:

- Moqhaka Local Municipality Final Integrated Development Plan 2021/2022 (2021)
- Moqhaka Spatial Development Framework 2019/2020 (SDF) (2018)

3.1. National Policy and Planning Context

Any project which contributes positively towards the objectives mentioned within national policies could be considered strategically important for the country. A review of the national policy environment suggests that the increased utilisation of Renewable Energy (RE) sources is considered integral to reducing South Africa's carbon footprint, diversifying the national economy, and contributing towards social upliftment and economic development. As the project comprises a RE project and would contribute RE supply to provincial and national targets set out and supported within these national policies, it is considered that the project fits within the national policy framework.

A brief review of the most relevant national legislation and policies is provided below.

3.1.1. Constitution of the Republic of South Africa (1996)

The Constitution of the Republic of South Africa (1996) is the supreme law of South Africa and forms the foundations for a democratic society in which fundamental human rights are protected. The Bill of Rights contained in Chapter 2 of the Constitution enshrines the rights of all people in South Africa and affirms the democratic values of human dignity, equality, and freedom. Section 24 of the Constitution pertains specifically to the environment. It states that:

24. Everyone has the right –

(a) To an environment that is not harmful to their health or well-being, and

(b) To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:

(i) Prevent pollution and ecological degradation.

(ii) Promote conservation.

(iii) Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

The Constitution outlines the need to promote social and economic development. Section 24 of the Constitution therefore requires that development be conducted in such a manner that it does not infringe on an individual's environmental rights, health, or well-being. This is especially significant for previously disadvantaged individuals who are most at risk to environmental impacts.

3.1.2. National Environmental Management Act (No. 107 of 1998) (NEMA)

The National Environmental Management Act (No. 107 of 1998) (NEMA) is South Africa's key piece of environmental legislation and sets the framework for environmental management in South Africa. It provides for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment. NEMA is founded on the principle that everyone has the right to an environment that is not harmful to their health or well‐being as contained within the Bill of Rights. In accordance with this it states that:

- The State must respect, protect, promote, and fulfil the social, economic and environmental rights of everyone and strive to meet the basic needs of previously disadvantaged communities.
- Sustainable development requires the integration of social, economic, and environmental factors in the planning, implementation, and evaluation of decisions to ensure that development serves present and future generations.
- Everyone has the right to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation, and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

In addition, the national environmental management principles contained within NEMA state that:

- Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural, and social interests equitably.
- Development must be socially, environmentally and economically sustainable.
- The social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed and evaluated, and decisions must be appropriate in the light of such consideration and assessment.

The need for responsible and informed decision-making by government on the acceptability of environmental impacts is therefore enshrined within NEMA.

3.1.3. White Paper on the Energy Policy of the Republic of South Africa (1998)

The White Paper on Energy Policy places emphasis on the expansion of energy supply options to enhance South Africa's energy security. This can be achieved through increased use of RE and encouraging new entries into the generation market. South Africa has an attractive range of cost-effective renewable resources, taking into consideration social and environmental costs. Government policy on RE 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.
- Addressing constraints on the development of the renewable industry.

The policy states that the advantages of RE include, minimal environmental impacts during operation in comparison with traditional supply technologies, generally lower running costs, and high labour intensities. Disadvantages include higher capital costs in some cases, lower energy densities, and lower levels of availability, depending on specific conditions, especially with sun and wind-based systems. Nonetheless, renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future. The White Paper on Energy Policy therefore supports the advancement of RE sources and ensuring energy security through the diversification of supply.

3.1.4. White Paper on the Energy Policy of the Republic of South Africa (2003)

The White Paper on Renewable Energy Policy Supplements Government's predominant policy on energy as set out in the White Paper on the Energy Policy of the Republic of South Africa (DME, 1998). The policy recognises the potential of RE and aims to create the necessary conditions for the development and commercial implementation of RE technologies. The position of the White Paper on RE is based on the integrated resource planning criterion of:

"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."

The White Paper on RE sets out Government's vision, policy principles, strategic goals and objectives for promoting and implementing RE in South Africa. The country relies heavily on coal to meet its

energy needs due to its abundant, and accessible and affordable coal resources. However, massive RE resources that can be sustainable alternatives to fossil fuels, have so far remained largely untapped. The White Paper on Renewable Energy Policy fosters the uptake of RE in the economy and has a number of objectives that include: ensuring equitable resources are invested in renewable technologies, directing public resources for implementation of RE technologies, introducing suitable fiscal incentives for RE and, creating an investment climate for the development of the RE sector.

The White Paper on Renewable Energy of 2003 set a target of 10 000GWh to be generated from RE by 2013 to be produced mainly from biomass, wind, solar and small-scale hydro. The target was subsequently reviewed in 2009 during the RE summit of 2009. The objectives of the White Paper on Renewable Energy Policy are considered in six focal areas, namely, financial instruments, legal instruments, technology development, awareness raising, capacity building and education, and market based and regulatory instruments. The policy supports the investment in RE facilities as they contribute towards ensuring energy security through the diversification of energy supply, reducing GHG emissions and the promotion of RE sources.

3.1.5. National Energy Act (No. 34 of 2008)

The purpose of the National Energy Act (No. 34 of 2008) is 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, while taking environmental management requirements into account. In addition, the Act also provides for energy planning, and increased generation and consumption of Renewable Energies (REs).

The objectives of the Act, are to amongst other things:

- Ensure uninterrupted supply of energy to the Republic.
- Promote diversity of supply of energy and its sources.
- Facilitate energy access for improvement of the quality of life of the people of the Republic.
- Contribute to the sustainable development of South Africa's economy.

The National Energy Act therefore recognises the significant role which electricity plays growing the economy while improving citizens' quality of life. The Act provides the legal framework which supports the development of RE facilities for the greater environmental and social good and provides the backdrop against which South Africa's strategic planning regarding future electricity provision and supply takes place. It also provides the legal framework which supports the development of RE facilities for the greater environmental and social good.

3.1.6. Integrated Energy Plan (IEP) (2016)

The Integrated Energy Plan (IEP) (which was developed under the National Energy Act (No. 34 of 2008)), recognises that energy is essential to many human activities, and is critical to the social and economic development of a country. The purpose of the IEP is essentially to ensure the availability of energy resources, and access to energy services in an affordable and sustainable manner, while minimising associated adverse environmental impacts. Energy planning therefore needs to balance the need for continued economic growth with social needs, and the need to protect the natural environment.

The IEP is a multi-faceted, long-term energy framework which has multiple aims, some of which include:

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

A draft version of the Integrated Energy Plan (IEP) was released for comment on 25 November 2016. The purpose of the IEP is to provide a roadmap of the future energy landscape for South Africa which guides future energy infrastructure investments and policy development. The development of the IEP is an ongoing continuous process. It is reviewed periodically to consider changes in the macroeconomic environment, developments in new technologies and changes in national priorities and imperatives, amongst others.

The 8 key objectives of the integrated energy planning process, are as follows:

- Objective 1: Ensure security of supply.
- Objective 2: Minimise the cost of energy.
- Objective 3: Promote the creation of jobs and localisation.
- Objective 4: Minimise negative environmental impacts from the energy sector.
- Objective 5: Promote the conservation of water.
- Objective 6: Diversify supply sources and primary sources of energy.
- Objective 7: Promote energy efficiency in the economy.
- Objective 8: Increase access to modern energy.

3.1.7. Integrated Resources Plan (IRP) (2019)

The Integrated Resource Plan (IRP) for electricity 2010 – 2030 is a subset of the IEP and constitutes South Africa's National electricity plan. The primary objective of the IRP is to determine the long-term electricity demand and detail how this demand should be met in terms of generating capacity, type, timing and cost. The IRP also serves as input to other planning functions, including amongst others, economic development and funding, and environmental and social policy formulation.

The current iteration of the IRP led to the Revised Balanced Scenario (RBS) that was published in October 2010. Following a round of public participation which was conducted in November / December 2010, several changes were made to the IRP model assumptions. The document outlines the proposed generation new-build fleet for South Africa for the period 2010 to 2030. This scenario was derived based on a cost-optimal solution for new-build options (considering the direct costs of

new build power plants), which was then "balanced" in accordance with qualitative measures such as local job creation.

The Policy-Adjusted IRP reflected recent developments with respect to prices for renewables. In addition to all existing and committed power plants, the plan includes 9.6GW of nuclear, 6.25GW of coal, 17.8GW of renewables, and approximately 8.9GW of other generation sources such as hydro, and gas.

Besides capacity additions, several assumptions have changed since the promulgation of IRP 2010–2030. Key assumptions that changed include the electricity demand projection, Eskom's existing plant performance, as well as new technology costs. These changes necessitated the review and update of the IRP which resulted in the draft IRP 2018 as per table 3.1 below:

Table 3.1: Published Draft IRP 2018 (Approved by Cabinet for Consultation)

	Coal	Nuclear	Hydro	Storage (Pumped Storage)	PV	Wind	CSP	Gas / Diesel	Other (CoGen, Biomass, Landfill)	Embedded Generation
2018	39 126	1 860	2 196	2 912	1 474	1 980	300	3 830	499	Unknown
2019	2 155					244	300			200
2020	1 433				114	300				200
2021	1 433				300	818				200
2022	711				400					200
2023	500									200
2024	500									200
2025					670	200				200
2026					1 000	1 500		2 250		200
2027					1 000	1 600		1 200		200
2028					1 000	1 600		1 800		200
2029					1 000	1 600		2 850		200
2030			2 500		1 000	1 600				200
TOTAL INSTALLED	33 847	1 860	4 696	2 912	7 958	11 442	600	11 930	499	2600
Installed Capacity Mix (%)	44.6	2.5	6.2	3.8	10.5	15.1	0.9	15.7	0.7	

Installed Capacity
Committed / Already Contracted Capacity
New Additional Capacity (IRP Update)

According to the South African Energy Sector Overview (2021), there is currently 1 723MW of installed PV capacity, while an additional 2 600MW from wind and solar has been rewarded as part of Bid window 5.

3.1.8. National Development Plan 2030 (2012)

The National Development Plan (NDP) 2030 is a plan prepared by the National Planning Commission in consultation with the South African public which is aimed at eliminating poverty and reducing inequality by 2030. The NDP aims to achieve this by drawing on the energies of its people, growing and inclusive economy, building capabilities, enhancing the capacity of the state and promoting

leaderships and partnerships throughout society. While the achievement of the objectives of the NDP requires progress on a broad front, three priorities stand out, namely:

- Raising employment through faster economic growth.
- Improving the quality of education, skills development and innovation.
- Building the capability of the state to play a developmental, transformative role.

In terms of the Energy Sectors role in empowering South Africa, the NDP envisages that, by 2030, South Africa will have an energy sector that promotes:

- Economic growth and development through adequate investment in energy infrastructure. The sector should provide reliable and efficient energy service at competitive rates, while supporting economic growth through job creation.
- Social equity through expanded access to energy at affordable tariffs and through targeted, sustainable subsidies for needy households.
- Environmental sustainability through efforts to reduce pollution and mitigate the effects of climate change.

The NDP aims to provide a supportive environment for growth and development, while promoting a more labour-absorbing economy. The proposed project will assist in reducing carbon emissions targets and creating jobs in the local area as well as assist in creating a competitive infrastructure based on terms of energy contribution to the national grid.

3.1.9. Strategic Infrastructure Projects (SIPs)

The Presidential Infrastructure Coordinating Committee (PICC) are integrating and phasing investment plans across 18 Strategic Infrastructure Projects (SIPs) which have the following 5 core functions:

- To unlock opportunity.
- Transform the economic landscape.
- Create new jobs.
- Strengthen the delivery of basic services.
- Support the integration of African economies.

A balanced approach is being fostered through greening of the economy, boosting energy security, promoting integrated municipal infrastructure investment, facilitating integrated urban development, accelerating skills development, investing in rural development and enabling regional integration.

SIP 8 of the energy SIPs supports the development of RE projects as follow:

- SIP 8: Green energy in support of the South African economy:

Support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP 2010) and supports bio-fuel production facilities.

The development of the proposed project is therefore also aligned with SIP 8 as it constitutes a green energy initiative which would contribute clean energy in accordance with the IRP 2010 – 2030.

3.2. Provincial Policies

This section provides an overview of the most relevant provincial policies. Naos Solar PV Project Two is considered to align with the aims of these policies, even if contributions to achieving the goals therein are only minor.

3.2.1. Free State Provincial Spatial Development Framework (PSDF) (2012)

The Free State PSDF is a policy document that promotes a 'developmental state' in accordance with national and provincial legislation and directives. It aligns with the Free State Provincial Growth and Development Strategy which has committed the Free State to 'building a prosperous, sustainable and growing provincial economy which reduces poverty and improves social development'.

The PSDF includes comprehensive plans and strategies that collectively indicate which type of land-use should be promoted in the province, where such land-use should take place, and how it should be implemented and managed. In broad terms, the PSDF:

- Indicates the spatial implications of the core development objectives of the Free State Provincial Growth and Development Strategy.
- Serves as a spatial plan that facilitates local economic development.
- Lays down strategies, proposals and guidelines as it relates to sustainable development.
- Facilitates cross-boundary co-operation between municipalities, adjoining provinces, and bordering countries.
- Serves as a manual for integration and standardisation of the planning frameworks of all spheres of government in the province.

The Free State Provincial Growth and Development Strategy states that sustainable economic development is the only effective means by which the most significant challenge of the Free State, namely poverty, can be addressed is. The PSDF gives practical effect to sustainable development, which is defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.

The PSDF is prepared in accordance with bioregional planning principles that were adapted to suit the site-specific requirements of the Free State. It incorporates and complies with the relevant protocols, conventions, agreements, legislation and policy at all applicable levels of planning, ranging from the international to the local.

The PSDF builds upon achievements and learns from mistakes of the past, reacts to the challenges of our time, incorporates the traditional knowledge of the people of the Free State, and builds upon international best-practice and technology.

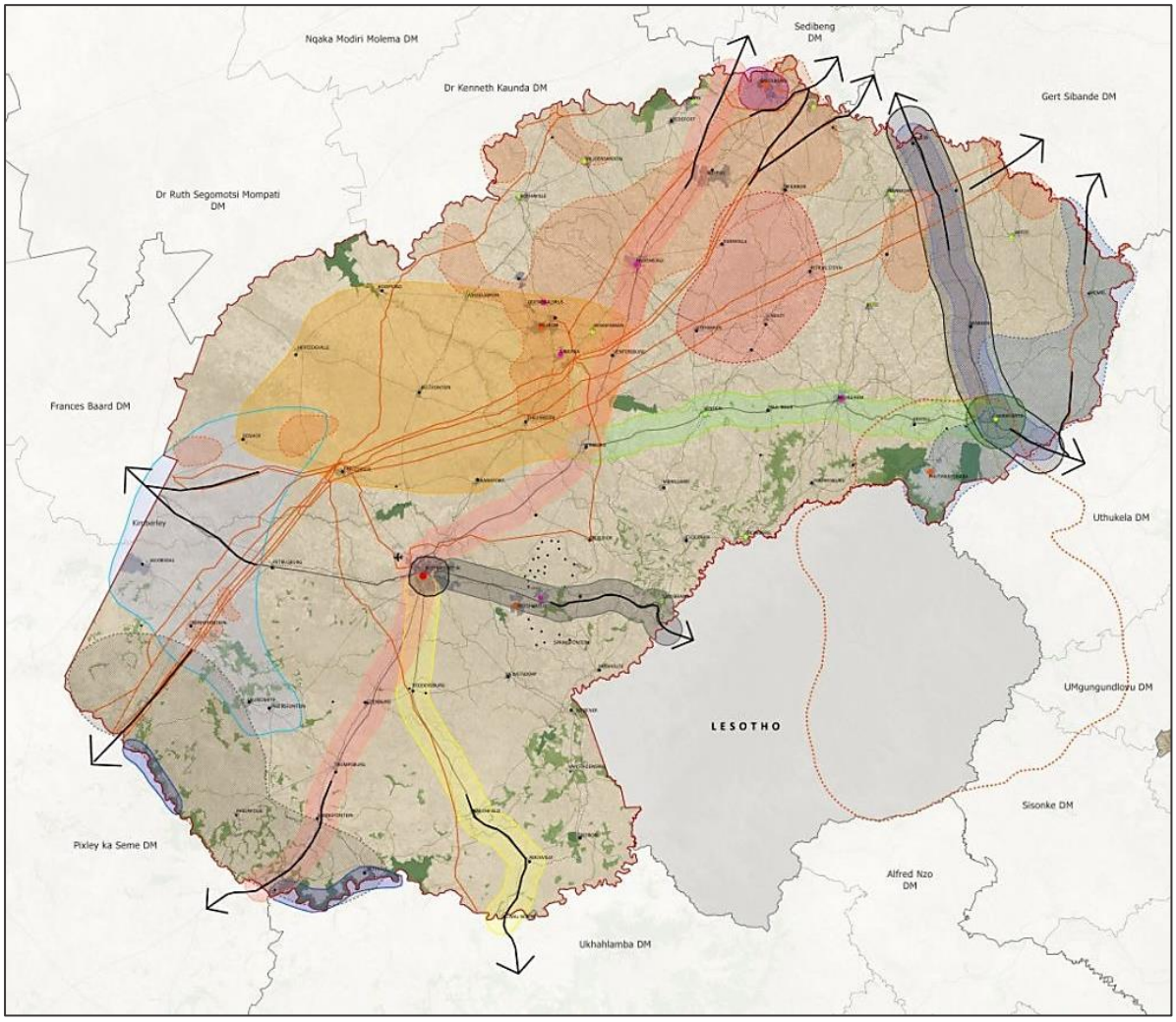


Figure 3.1: Free State Provincial Spatial Development Framework map

3.3. District and Local Municipalities Policies

The strategic policies at DM and LM level have similar objectives for the respective areas, namely, to accelerate economic growth, create jobs, and uplift communities. Naos Solar PV Project Two is considered to also align with the aims of these policies, even if contributions to achieving the goals therein are only minor.

3.3.1. Fezile Dabi DM Final Draft Integrated Development Plan (IDP) 2021 – 2022 (2021)

The long-term vision of the Fezile Dabi DM is: *"Improving the lives of citizens and progressively meeting their basic, social and economic needs, thereby restoring community confidence and trust in government".*

The above stated vision defines what Fezile Dabi District Municipality would like to attain over medium to long-term, and for that achievement to effectively materialize, their mission is that: *"Fezile Dabi District Municipality will strive to be a more responsive and accountable municipality towards sustainable development".*

Of the eighteen (18) SIPs that are contained in the National Infrastructure Plan (NIP), there are eight which impacts on the Fezile Dabi District and thus need to be recognized and where appropriate; the

municipality's plans will be aligned with these SIPs in an effort to respond to national government's service delivery initiatives. Furthermore, work is to be done to align key cross-cutting areas, namely human settlement planning and skills development in line with each of the Strategic Infrastructure Projects, especially:

- Green Energy in support of the South African economy (SIP 8): Supporting sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP 2010).
- Electricity Generation to support socio-economic development (SIP 9): acceleration of the construction of new electricity generation capacity in accordance with the IRP 2010 to meet the needs of the economy; and addressing historical imbalances.

3.3.2. Moqhaka Local Municipality Draft Integrated Development Plan 2021/2022 (2021)

The vision of the Moqhaka LM is to "…strive to *be a Municipality that creates an enabling environment for socio economic growth and sustainable development."*

The Mission Statement is *"To maintain and enhance quality of life by providing effective, efficient quality and affordable services equitably and facilitating sustainable socio-economic growth through active community participation."*

The vision and mission of the municipality have led to the conceptualisation of the following strategic objectives in the figure below:

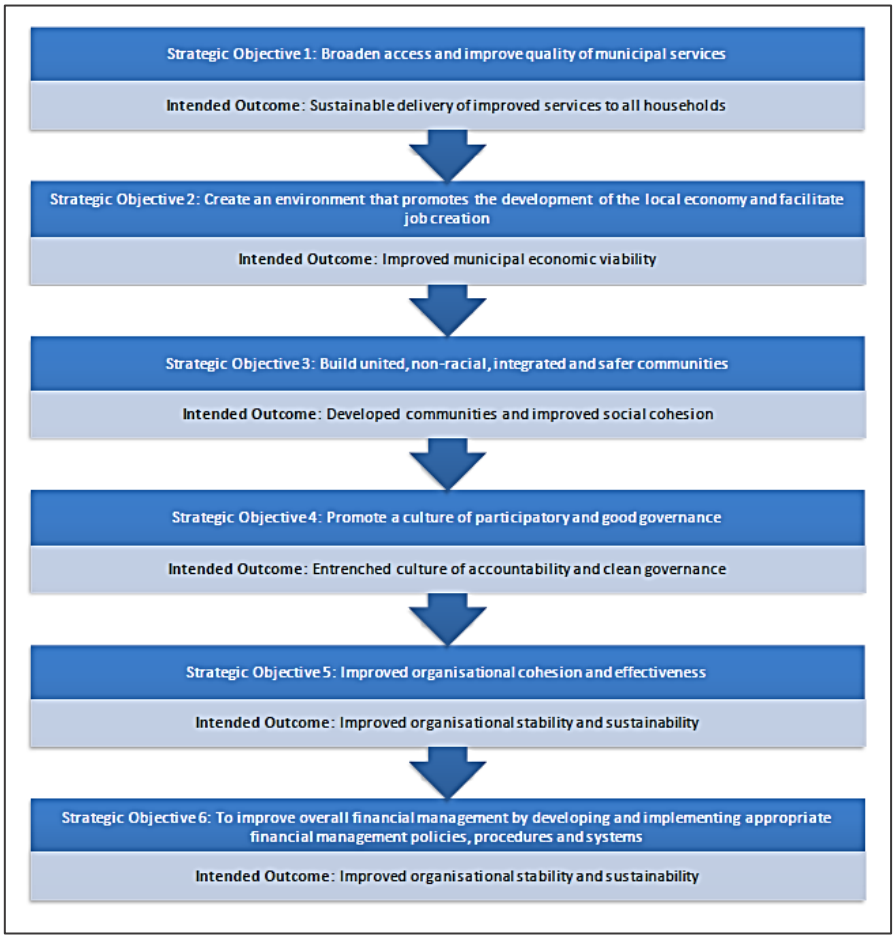


Figure 3.2: Moqhaka LM Strategic Objectives.

3.3.3. Moqhaka Local Municipality Spatial Development Framework (2020)

The SDF Technical Committee was tasked to prepare statements on the long-term spatial development of the region. The ensuing development goals were prepared during a formal session of the SDF Technical Committee:

Long Term Spatial Vision: 2030 *"Moqhaka, as an integrated spatial unit, responsibly catering for all community development needs."*

Spatial Development Vision: 2020 *"A regional and national role-player, serving the Free State and beyond, cognisant of the natural environment, promoting social and economic inclusion through mining, tourism, industrial and agri-industrial related development."*

The Spatial Development Goals of the Municipality are summarized below:

- Continuous community consultation prior to any spatial framework changes should be adopted as a principle.
- Revitalisation and re-population of the rural areas are considered as significant to enhance development of the region.

- **A: CORE & B: BUFFER AREAS**

  - Developments aligned with environmental legislation and policy and cognisant of protecting the environment and the optimisation of natural resources.
  - To promote the optimal development and utilisation of the unique tourism potential of the Moqhaka region, whilst not compromising the outstanding universal value of the adjacent VDWHS and unduly impairing the safe, undisturbed and quiet enjoyment of the area.

- **C: AGRICULTURAL AREAS**

  - Enhancement of current predominant agri-industrial development focus, with access to agricultural land, commonage and all urban agriculture endeavours to the benefit of the broader community.
  - Responsible utilisation and control measures (carrying capacity) of commonage and agricultural resources and the protection of high potential agricultural land.

- **D: URBAN RELATED**

  - Meeting SPLUMA requirements for spatial justice.
  - Employing norms and standards in ensuring the availability of amenities in all urban areas; restricting conversion thereof into other land uses.
  - Inclusionary housing developments must ensure differentiation in typologies and provide for densification and infill planning intercepting sprawl.

- An integrated and efficient land use management system to be implemented, ensuring unhindered progression of the development processes.

- **E: INDUSTRIAL AREAS**
  - Kroonstad will remain the primary industrial focal point of the region with strong agri-industrial focuses in Viljoenskroon and Steynsrus.
  - Continual expansion of the industrial zones must procure preference.

- **F: SURFACE INFRASTRUCTURE & BUILDINGS**

  - Development should be feasible; especially in relation to the availability of infrastructure services.
  - Access to services must be ensured to the broader community.
  - Infrastructure and bulk service delivery must continually focus on:
    - eradication of backlogs;
    - maintenance;
    - upgrading;
    - new infrastructure to meet development needs; and
    - appropriate service provision to new precincts.

3.4. Conclusion

The review of relevant legislation, policies and documentation pertaining to the energy sector indicate that renewable or green energy (i.e., energy generated by naturally occurring renewable resources) and therefore, the establishment of Naos Solar PV Project Two is supported at a national, provincial, DM, and LM level, and that the proposed project will contribute positively towards several targets and policy aims. Specifically, those relating to social and economic development and upliftment, and employment creation.

4. SOCIO-ECONOMIC PROFILE

The Naos Solar PV Project Two is located on Portion 2 of the Farm Waterford No. 573, within the Moqhaka LM of the Fezile Dabi DM in the Free State Province. The town of Viljoenskroon is located approximately 24 km South of the proposed development and the town of Orkney is approximately 24km to the South West of the proposed site.

The project entails the generation of up to 200MW electrical power through photovoltaic (PV) panels. The total development footprint of the project will approximately be 300 hectares (including supporting infrastructure on site) – refer to table 4.1 for general site information. The property on which the facility is to be constructed will be leased by Naos Solar PV Project Two (Pty) Ltd. from the property owner for the lifespan of the project (minimum of 20 years).

Table 4.1: General site information

Description of affected farm portions	<u>Naos Solar PV Project Two</u> Portion 2 of the Farm Waterford No. 573 <u>Power Line Alternatives 1A, 1B and 1C (1B is the technically preferred alternative)</u> Portion 1 of the Farm Waterford No. 573 Portion 1 La Reys Kraal Zuid No. 165 Portion 2 of the Farm Kleinfontein No. 369 Remaining Extent of the Farm Kleinfontein No. 369 Portion 2 of the Farm Zaaiplaats No. 190 Portion 3 of the Farm Zaaiplaats No. 190 Portion 2 of the Farm Biesiefontein No. 173 Farm Doornplaats 599 <u>Power Line Alternative 2</u> Portion 1 of the Farm Waterford No. 573 Portion 1 La Reys Kraal Zuid No. 165 Portion 2 of the Farm Kleinfontein No. 369 Remaining Extent of the Farm Kleinfontein No. 369 Portion 2 of the Farm Zaaiplaats No. 190 Portion 3 of the Farm Zaaiplaats No. 190 Portion 2 of the Farm Biesiefontein No. 173 <u>Power Line Alternative 3</u> Portion 1 of the Farm Waterford No. 573 Portion 1 La Reys Kraal Zuid No. 165 Portion 1 of the Farm Kleinfontein No. 369 Portion 2 of the Farm Kleinfontein No. 369 Remaining Extent of the Farm Kleinfontein No. 369 Portion 3 of the Farm Zaaiplaats No. 190 Portion 2 of the Farm Biesiefontein No. 173

	<u>Power Line Alternative 4</u> Portion 1 of the Farm Waterford No. 573 Portion 2 of the Farm Waterford No. 573 Portion 2 of the Farm Biesiefontein No. 173 Portion 4 of the Farm Biesiefontein No. 173 Remaining Extent of the Farm Biesiefontein No. 173 Portion 1 of the Farm Kleinfontein No. 369 Portion 3 of the Farm Zaaiplaats No. 190
Province	Free State
District Municipality	Fezile Dabi District Municipality
Local Municipality	Moqhaka Local Municipality
Ward numbers	22
Closest towns	The town of Viljoenskroon is located approximately 24 km south of the proposed developments.
21 Digit Surveyor General codes	<u>Naos Solar PV Project Two</u> Portion 2 of the Farm Waterford No. 573 - F03600000000057300002 <u>Power Line Alternatives 1A, 1B and 1C (1B is the technically preferred alternative)</u> Portion 1 of the Farm Waterford No. 573 - F03600000000057300001 Portion 1 La Reys Kraal Zuid No. 165 - F03600000000016500001 Portion 2 of the Farm Kleinfontein No. 369 - F03600000000036900002 Remaining Extent of the Farm Kleinfontein No. 369 - F03600000000036900000 Portion 2 of the Farm Zaaiplaats No. 190 - F03600000000019000002 Portion 3 of the Farm Zaaiplaats No. 190 - F03600000000019000003 Portion 2 of the Farm Biesiefontein No. 173 - F03600000000017300002 Farm Doornplaats 599 - F03600000000059900000 <u>Power Line Alternative 2</u> Portion 1 of the Farm Waterford No. 573 - F03600000000057300001 Portion 1 La Reys Kraal Zuid No. 165 - F03600000000016500001 Portion 2 of the Farm Kleinfontein No. 369 - F03600000000036900002

	Remaining Extent of the Farm Kleinfontein No. 369 - F03600000000036900000 Portion 2 of the Farm Zaaiplaats No. 190 - F03600000000019000002 Portion 3 of the Farm Zaaiplaats No. 190 - F03600000000019000003 Portion 2 of the Farm Biesiefontein No. 173 - F03600000000017300002 <u>Power Line Alternative 3</u> Portion 1 of the Farm Waterford No. 573 - F03600000000057300001 Portion 1 La Reys Kraal Zuid No. 165 - F03600000000016500001 Portion 1 of the Farm Kleinfontein No. 369 - F03600000000036900001 Portion 2 of the Farm Kleinfontein No. 369 - F03600000000036900002 Remaining Extent of the Farm Kleinfontein No. 369 - F03600000000036900000 Portion 3 of the Farm Zaaiplaats No. 190 - F03600000000019000003 Portion 2 of the Farm Biesiefontein No. 173 - F03600000000017300002 <u>Power Line Alternative 4</u> Portion 1 of the Farm Waterford No. 573 - F03600000000057300001 Portion 2 of the Farm Waterford No. 573 - F03600000000057300002 Portion 2 of the Farm Biesiefontein No. 173 - F03600000000017300002 Portion 4 of the Farm Biesiefontein No. 173 - F03600000000017300004 Remaining Extent of the Farm Biesiefontein No. 173 - F03600000000017300000 Portion 1 of the Farm Kleinfontein No. 369 - F03600000000036900001 Portion 3 of the Farm Zaaiplaats No. 190 - F03600000000019000003
Type of technology	Photovoltaic solar facility
Structure Height	Panels up to 3m, buildings ~ 4m, power line ~30m, BESS ~2.8m
Surface area to be covered (Development footprint)	Naos Solar PV Project Two: up to 300ha

Structure orientation	Tracking PV with bi-facial panels. Bi-facial panels with single axis tracking is preferred over fixed-axis or double axis tracking systems and mono-facial panels due to the potential to achieve higher annual energy yields whilst minimising the balance of system (BOS) costs, resulting in the lowest levelized cost of energy (LCOE). The development of the PV facility will take into consideration during the final design phase the use of either mono-facial or bi-facial PV panels as well as tracker vs fixed-tilt mounting structures. Both options are considered feasible for the site.
Generation capacity	Naos Solar PV Project Two: up to 200MW

This Chapter provides an overview of the socio-economic environment within which Naos Solar PV Project Two is proposed for development and provides the socio-economic basis against which potential issues can be identified.

4.1. Free State Province

Free State Province is the landlocked core of the country. It is centrally placed, with good transport corridors to the north and the coast. It is the third biggest of South Africa's nine provinces in terms of size, and primary agriculture is a key economic sector. Mining is also important but has been declining steadily since 2008.

The Free State is situated in the heart of the country, between the Vaal River in the north and the Orange River in the south, bordered by the Northern Cape, Eastern Cape, North West, Mpumalanga, KwaZulu-Natal and Gauteng provinces, as well as Lesotho. The Free State is a rural province of farmland, mountains, goldfields, and widely dispersed towns. This province is an open, flat grassland with plenty of agriculture that is central to the country's economy. Mining is its largest employer.

Bloemfontein is the capital and is home to the Supreme Court of Appeal, as well as the University of Free State and the Central University of Technology. The province also has 12 gold mines, producing 30 percent of South Africa's output.

Although the Free State is the third-largest province in South Africa, it has the second-smallest population and the second-lowest population density. It covers an area of 129 825km² and has a population of 2 834 714 – 5.1% of the national population. Languages spoken include Sesotho (64.4%), Afrikaans (11.9%) and Zulu (9.1%). The Free State Province contributes 5.4% to South Africa's total gross domestic product (2006).

Agriculture is a key economic sector – 8% of the country's produce comes from Free State. In 2010, agriculture provided 19.2% of all formal employment opportunities in the region. The economy is dominated by agriculture, mining and manufacturing. Known as the 'bread-basket' of South Africa, about 90% of the province is under cultivation for crop production. It produces approximately 34% of the total maize production of South Africa, 37% of wheat, 53% of sorghum, 33% of potatoes, 18% of

red meat, 30% of groundnuts and 15% of wool. The province is the world's fifth-largest gold producer, with mining the major employer.

Other mineral resources – gold, diamonds, and low-grade coal – are also important to the province; mining contributed 9% to the local economy and employed some 33 000 people in 2010. Other commodities include clay, gypsum, salt, and uranium.

Manufacturing also features in the provincial economic profile. This sector makes up 14% of the provincial output, with petro-chemicals (via Sasol) taking account of more than 85% of the output.

Free State is strategically placed to take advantage of the national transport infrastructure. Two corridors are of particular importance: the Harrismith node on the N3 corridor between Gauteng and KwaZulu-Natal and the N8. The N1 joins Gauteng to the Western Cape. Bloemfontein International Airport handles about 250 000 passengers and about 221 000 tons of cargo a year.

Important towns include Welkom, the heart of the goldfields; Odendaalsrus, another gold-mining town; Sasolburg; Kroonstad; Parys; and Phuthaditjhaba. The Free State is also home to the Vredefort Dome, the largest visible meteor-impact site in the world, which was formed two billion years ago when a meteorite 10 kilometres wide slammed into Earth. The Vredefort Dome is one of South Africa's seven UNESCO World Heritage sites.

In the north-eastern Free State is the Golden Gate Highlands National Park, which is the province's prime tourist attraction.

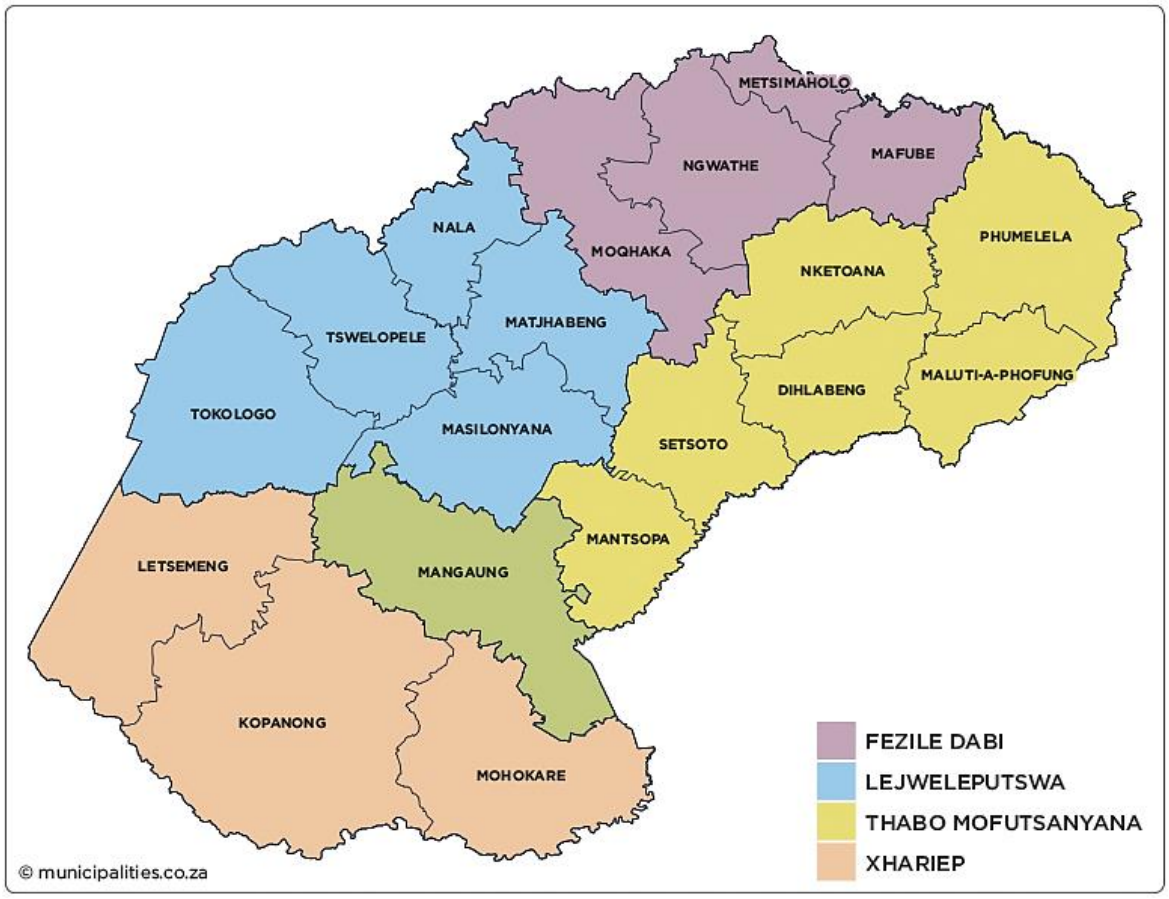


Figure 4.1: Map showing the DMs of the Free State Province (Source: www.municipalities.co.za).

4.2. Fezile Dabi DM

The Fezile Dabi District Municipality is a Category C municipality, formerly known as the Northern Free State District Municipality, situated in the north of the Free State. It is bordered by the North West, Gauteng and Mpumalanga Provinces to the north, Thabo Mofutsanyana District to the south, and Lejweleputswa District to the west.

The municipality is the smallest district in the province, covering an area of 20 660km^2 and only making up 16% of its geographical area. It consists of four local municipalities: Moqhaka, Metsimaholo, Ngwathe and Mafube.

The main attraction site, the Vredefort Dome, being the third-largest meteorite site in the world, is located within the district.

The main economic sectors include: Trade (22%), community services (20%), manufacturing (13%), households (13%), agriculture (12%), finance (7%), construction (6%), transport (5%).

In 2011 the Municipality had a population of 488 036 with an unemployment rate of 33.9% and a youth unemployment rate of 44.4%. By 2016 only 48.3% of dwellings had piped water inside their dwellings and 7.7% of household still did not have electricity in their dwellings.

Figure 4.2: Map showing the LMs of the Fezile Dabi DM (Source: www.municipalities.co.za).

4.3. Moqhaka LM

The Moqhaka Local Municipality is a Category B municipality situated within the southern part of the Fezile Dabi District in the Free State Province. It is the largest of four municipalities in the district, making up over a third of its geographical area and covering an area of 7 925m^2. The former Kroonstad, Steynsrus and Viljoenskroon Transitional Local Councils and sections of the Riemland, Kroonkop and

Koepel Transitional Rural Councils are included in the municipality. The seat of local government is Kroonstad. The community's name is the south Sesotho word for 'crown'.

The general tendency of migration from rural to urban areas is also occurring in the area, as is the case in the rest of the Free State Province. In comparison to the other municipalities within the Fezile Dabi District, it appears as if Moqhaka is significantly less urbanised. The population dwindled from 2011 at 160 532 to 154 732 in 2016. In 2011 the unemployment rate stood at 35.2% and the youth unemployment rate at 47.2%. In 2016 89.7% of households had flush toilets connected to sewerage and 96.3% of households had electricity for lighting in their dwellings.

The Greater Kroonstad area is the centre of a large agricultural community that plays an important role in the economy of the district. Subsequently, industrial activities contribute significantly to the district's economy. The Department of Correctional Services and the School of Engineers military bases are situated in the town. Kroonstad has recently become a distinguished holiday destination due to the ultra-modern and popular holiday resort of Kroonpark, adjacent to the Vals River. The urban area is situated adjacent to the N1 National Road and located adjacent to one of the largest and most important four-way railway junctions in South Africa.

The Viljoenskroon/Rammulotsi urban area is located within an area of extreme agricultural significance. The urban area plays a significant role in providing residential opportunities to the adjacent goldfields and mining activities in the North West Province. The Provincial Roads P15/1 and P15/2 from Kroonstad to Klerksdorp in the North West Province extend through the area from north to south.

The Steynsrus/Matlwangtlwang urban area is situated approximately 45km east of Kroonstad and 92km west of Bethlehem. The major link road between Bethlehem and Kroonstad stretches adjacent to the urban area.

The main economic sectors in the municipality are Agriculture, commercial transport, business services and mining.

4.4. Project Site

The proposed Naos Solar PV Project Two will be located on Portion 2 of the Farm Waterford No. 573, situated in the Moqhaka LM and the Fezile Dabi DM, Free State Province. The town of Viljoenskroon is located approximately 24 km south of the proposed development and Orkney is 16km to the west of the proposed development. Refer to the locality map below:

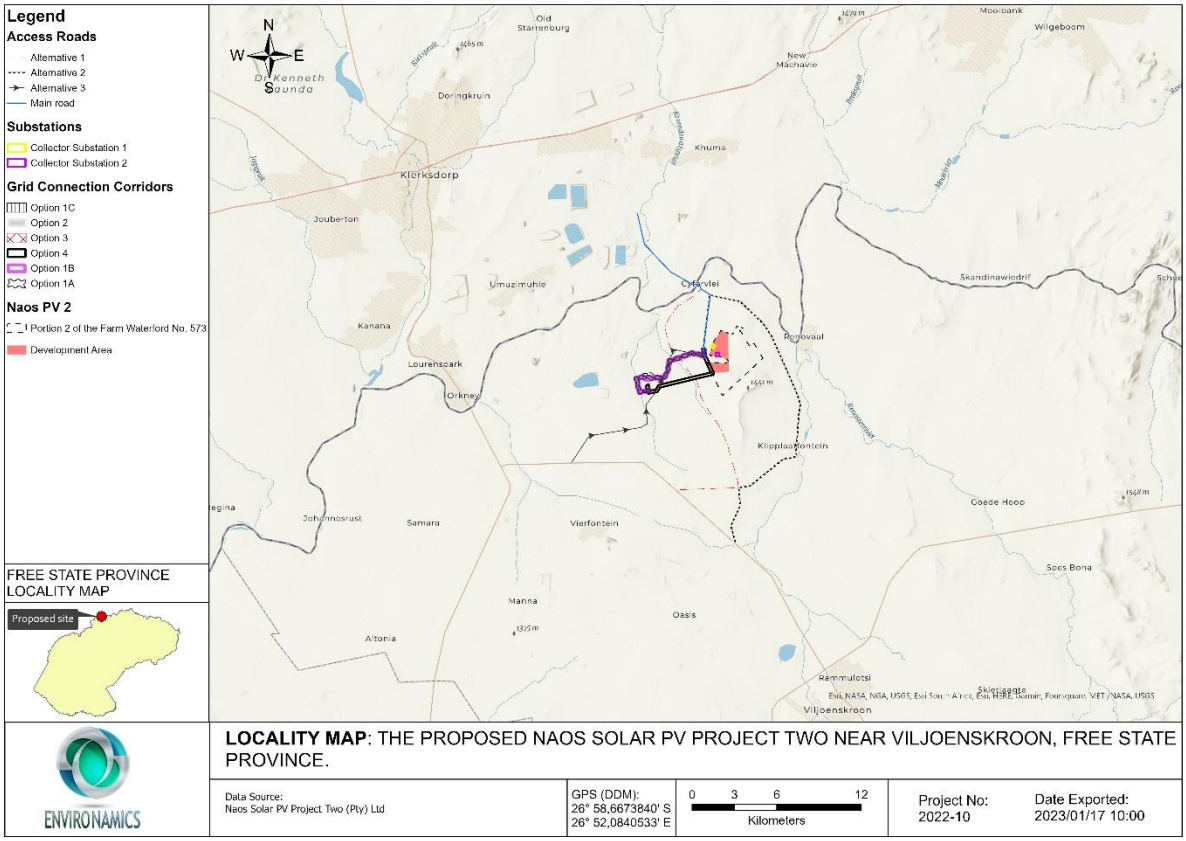


Figure 4.3: Locality map for the proposed Naos Solar PV Project Two near Viljoenskroon, Free State Province.

A site visit was conducted on 20 July 2022 of Portion 2 of the Farm Waterford No. 573, Free State Province please refer to the photos below for a better understanding of the proposed site.

Figure 4.4: Approximate centre of the site, taken towards the north.

Figure 4.5: Approximate centre of the site, taken towards the north east.

Figure 4.6: Approximate centre of the site, taken towards the east.

Figure 4.7: Approximate centre of the site, taken towards the south east.

Figure 4.8: Approximate centre of the site, taken towards the south.

Figure 4.9: Approximate centre of the site, taken towards the south west.

Figure 4.10: Approximate centre of the site, taken towards the west.

Figure 4.11: Approximate centre of the site, taken towards the north west.

4.5. Adjacent Properties

Most of the surrounding area has a low number of farmsteads/buildings that are sparsely populated. The area is located within an agricultural and mining region, and the immediate area is presently used mainly for livestock farming as well as crop production. The table below provides a summary of the current land uses and characteristics of the adjacent properties.

Table 4.2: Adjacent landowners

Farm Name & Portion	Location	Landowner names	Any residents living on the farm (i. e. farm workers, tenants, landowners)	Homesteads/ Buildings on farm	Current activities taking place on the farm (cattle farming etc.)	Comments noted
Portion 2 of the Farm Waterford No. 573	Landowner	Waterford Boerdery Trust: Carl Crous	None	None	Cattle grazing, Pivots and crop farming.	The farmer has no objections with regards to the project.
Portion 1 of the Farm Waterford No. 573	Adjacent Landowner (North/ North West)		None	None		
Portion 3 of the Farm Waterford No. 573	Adjacent Landowner (North/ North East)		None	None		
Remaining extent of the Farm Paradys No. 137	Adjacent Landowner (South/ South East)	BOTHA'S SHALOM BOERDERY PTY LTD Cobus Botha	Two families	Three houses and a store	Pivots and cattle grazing and some Game.	Overall he had no negative comments with regards to the project
The farm Smaldeel No. 157	Adjacent Landowner (South West)	Gerrit Botha Trust	None	None	Crops	He has no objections with regards to the project.
Portion 4 of the Farm Biesiefontein No. 173	Adjacent Landowner (South West)	MULLER JOHANNES STEPHANUS (Landowner) Hannes Ollewagen (Spokesperson)	One family and about 20 Workers	One house, workers houses and many outside buildings and sheds.	Feedlot and crop farming	He said that they don't have any concerns with regards to the project. They are also the owners of Wawielpark Holiday Resort and would not like that the safety and relaxing environment be compromised and negatively influence their guests.
Portion 3 of the Farm Biesiefontein No. 173	Adjacent Landowner (South West)					

Important I&APs		
Holiday resort	Activities	Comments
Wawielpark Holiday resort	Pools and activities especially for children. There is also fishing spots, canoos and paddle boats to keep guests entertained.	Overall they are very positive with regrads to te project they would just not like that the safety and relaxing environment must be compromised for their guests.
Clementia Function & Conference Venue	They do functions and weddings and also hosts overnight guests.	The women was very friendly and did not have any negative feelings towards the project, she would just like to receive more information about the project and how it will influence them and their guests. She will reply to the email after the information has been sent to her. (dplessw@telcomsa.co.za)

Seekoeigat camping site	Camping site and fishing spot.	They asked that all the information must be sent to the owner via email and then he will provide comments. The owner is Jan Geldenhuis (jugeldenhuis@live.co.za). While talking to them the owner of Fish Eagle Estate was also present. They are right next to the Camping site. He would also like to receive more information with regards to the project (vivviersanton@gmail.com)

Refer to figure 4.12 below for a map of the surrounding land portions:

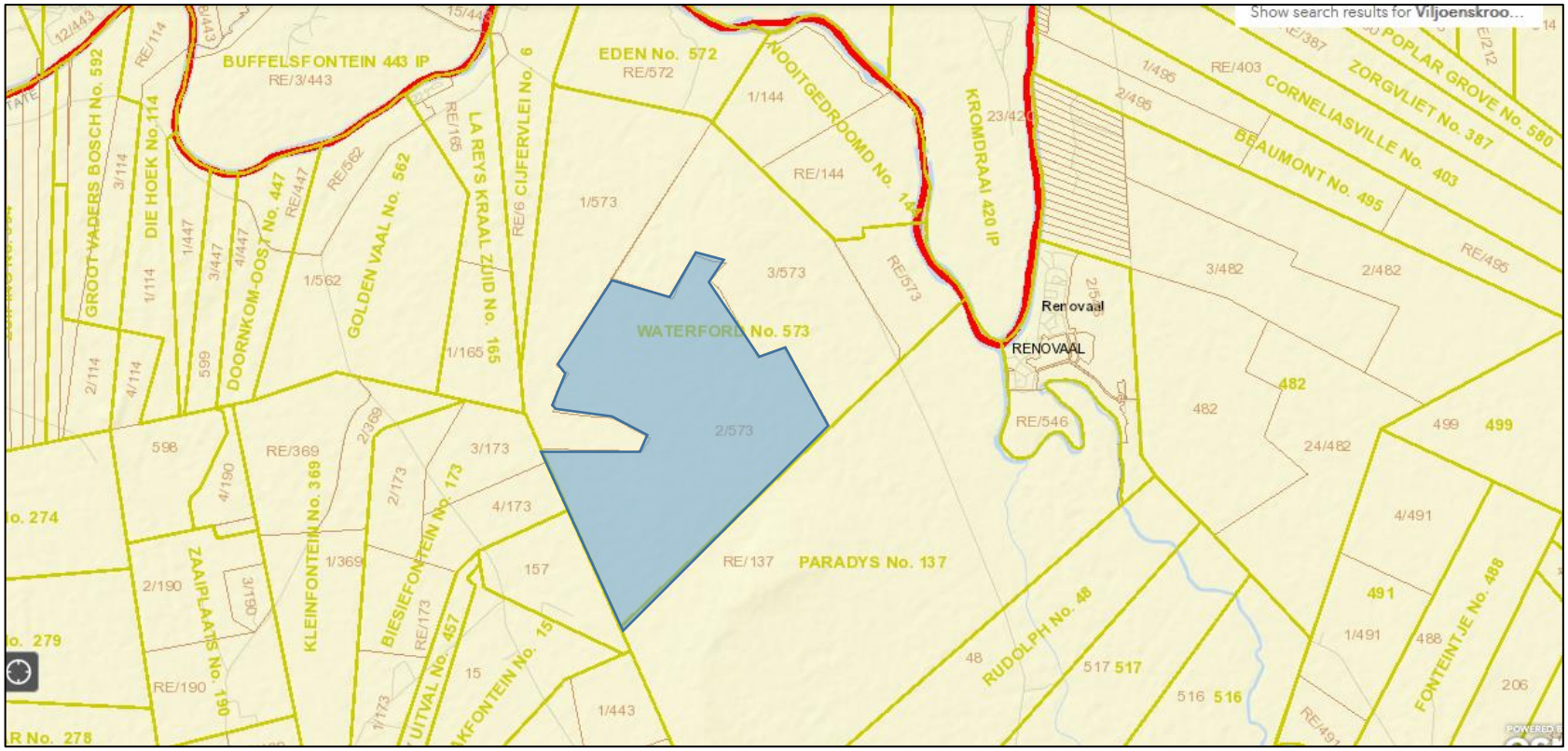


Figure 4.12: Map of the surrounding landowners for Portion 2 of the Farm Waterford No. 573 (Chief Surveyor General database).

4.6. Baseline Description of the Social Environment

The following subsections provide an overview of the socio-economic profile of the Moqhaka LM. In order to provide context against which the LM's socio-economic profile can be compared, the socio-economic profiles of the Fezile Dabi DM, Free State Province, and South Africa as a whole have also been provided where applicable. The data presented in this section have been derived from the 2011 Census (which may be outdated at this stage but is deemed sufficient for the purpose of this study), the Local Government Handbook South Africa 2018, the Free State Spatial Development Framework (PSDF), and the Fezile Dabi DM and Moqhaka LM IDPs.

4.6.1. Population Size

Understanding the population dynamics of an area is important as it provides an overview of the human capital present within an area. It therefore provides an insight into the potential labour pool, from which workers may be sourced, as well as the local communities which may either be impacted on, or benefit from, a particular project. Population trends within an area also affect economic growth, and the demand for goods and services.

Table 4.3: Overview of general statistics of South Africa, Free State Province, Fezile Dabi DM, and Moqhaka LM (Source: Census 2011).

Census 2011	Area (km^2)	Population total	Population density/km^2
South Africa	1 220 813	51 770 560	42.4
Free State Province	129 825	2 745 590	21.1
Fezile Dabi DM	20 688	488 036	23.6
Moqhaka LM	7 925	160 532	20.3

The population growth rate from 2001-2011 was not included as the Census data is too outdated for the purpose of this report. A Census will be conducted during 2021 which will shed a more accurate light on the population growth and decline of certain areas.

A Community survey was however conducted in 2016 which indicated that Fezile Dabi DM had a population increase between 2011 and 2016 to 497 777, which makes up 17.45% of the Free State Province's population. The Moqhaka LM's population has declined by 0.8% for the same period with a population total of 154 732.

4.6.2. Population Group Dynamics

Information on population group dynamics provides a better understanding of the cultural dynamics which may be prevalent within the area. This is important in terms of determining the potential for community support, the likely community structure and appropriate / most-suited consultation practises to utilise when engaging with the local communities (and whether different communication strategies should be adopted for different community groups).

According to the 2016 Community Survey and 2011 Census data, the Moqhaka LM, Africans are 87.19% and Coloured 2.86% of the total population. Indian/Asian are 0.33% and whites make out 9.32% of the total population.

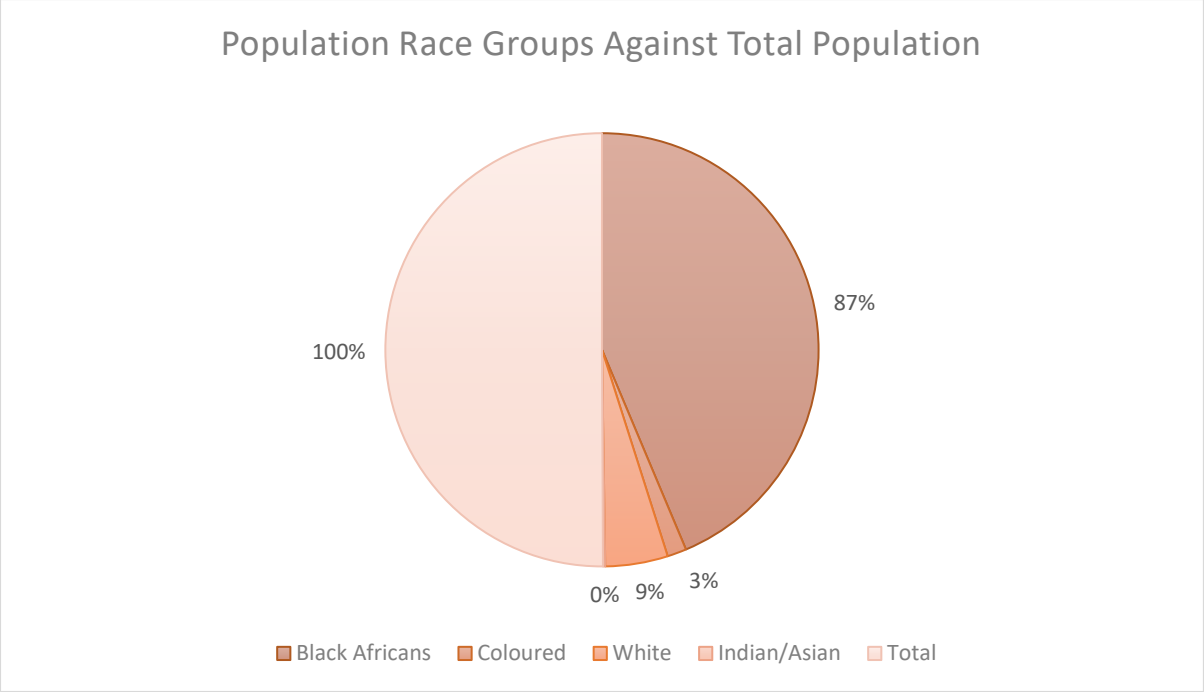


Figure 4.13: Total Population of the Moqhaka LM by population group (Statistics South Africa, Census 2011 (Boundaries 2016).

4.6.3. Gender Profile

The gender profile of a population has significance in terms of gender distribution, and understanding the gender roles prevalent within the area. The Moqhaka LM's female population is 50,49% of the total population of the municipality. The sex ratio for the Fezile Dabi DM is almost consistent with that of Moqhaka LM, with a female population of 50,55%. The data from the DM and LM does however not coincide with that of the province since 58,3% of the population are male and 41,7% are female. The national average in 2016 was 50,65% female and 49,35% male.

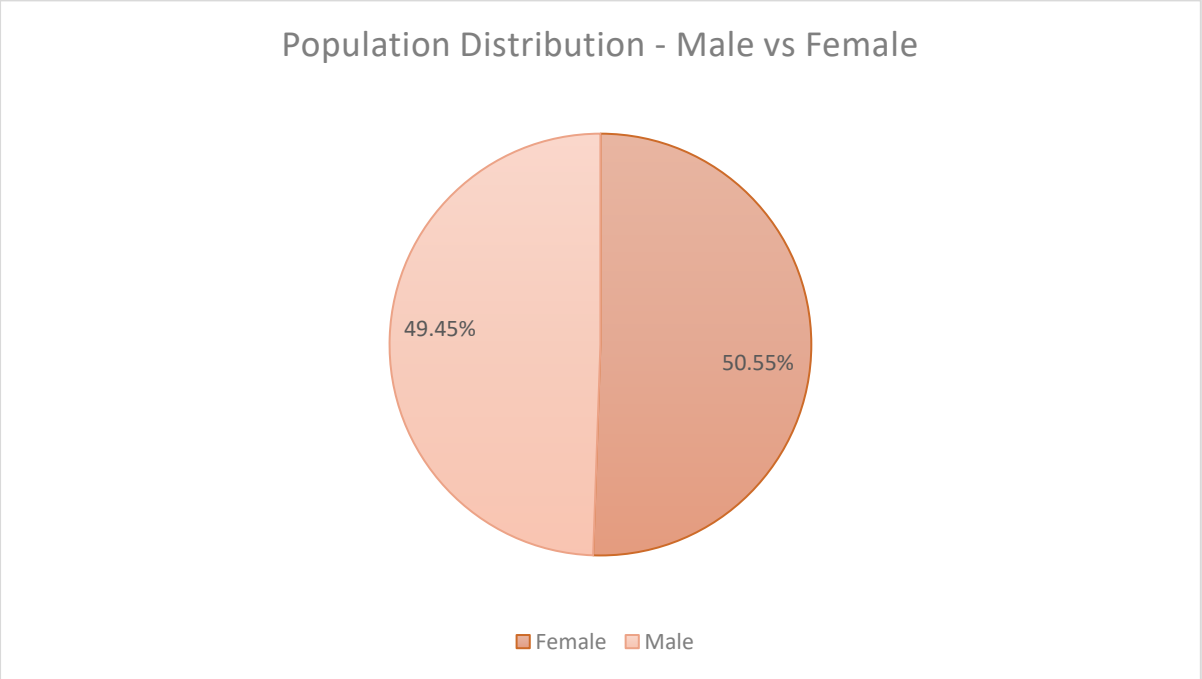


Figure 4.14: Population Distribution by Gender of the Moqhaka LM (Census data 2011).

4.6.4. Age Profile

The age structure of a population is important for planning purposes, as it provides insight into what services may be required, and the level to which such services are required. For example, if a population is predominantly over the age of 65 years, then such portion of the population is no longer economically active, and would indicate the need for services such as retirement villages, health care etc. Where most of the population is economically active (between the ages of 15 and 64, the need for business opportunities, suitable employment etc. arises.

The Moqhaka LM has a youth population (0-14 years) of 27%, working age population (15-64 years) of 66,4% and an elderly population (65+ years) of 6,5%.

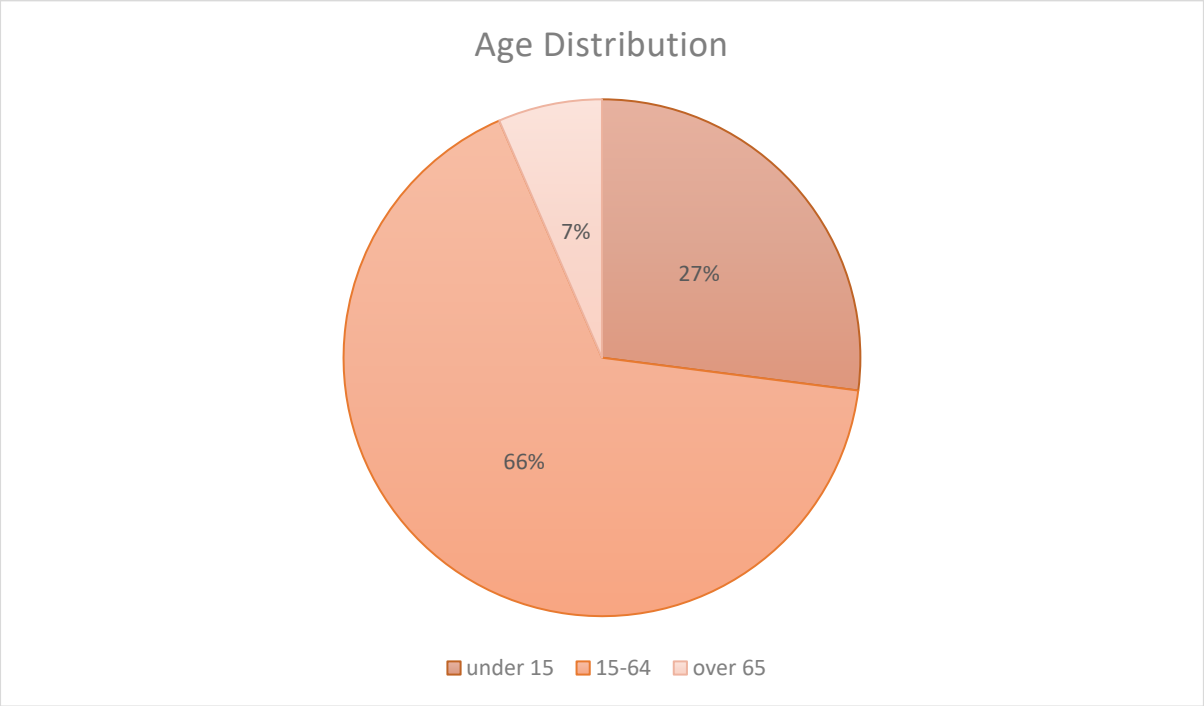


Figure 4.15: Moqhaka Age Distribution (Census 2011).

The higher proportion of potentially economically active persons within the Moqhaka LM implies that there is a considerable human resource base for development projects to involve local population. The economically active population represents the largest proportion of the population, which means that focus needs to be placed on employment creation.

4.6.5. Dependency Ratio

An area's dependency ratio provides an indication of that portion of the population which is dependent on the economically active portion of the population based on functional age groups. The dependent portion of the population typically comprises youth below 15 years of age which are yet to enter the workforce, and individuals 65 years and older which would typically already have retired from the workforce. In addition to not contributing towards the economy, such individuals are also likely to have additional needs which need to be catered for, such as access to suitable education facilities for the school going population, and access to health care facilities in the case of the aged population. The dependency ratio is calculated by combining the number of children aged under 15

years, and the number of adults aged 65 years and older and dividing this by the working age population (i.e., those ages between 15 and 64 years of age).

The Moqhaka LM had a dependency ratio of 50.5 in 2011, implying that for every 100 people within the Moqhaka LM, 50.5 (i.e., over a half) of them are considered dependent. This figure is consistent with that of Fezile Dabi DM (51.9) and the province (52.9) dependency ratios but is considerably higher than that of the National (34.5) dependency ratio.

4.6.6. Education Level

Education plays a pivotal role in community development. The level of education influences growth and economic productivity of a region. There is a positive correlation between a higher level of education and the level of development, and standard of living. Education levels in any given population will influence both economic and human development. While low levels of education typically lead to a low skills base within an area, high levels of education have the opposite effect, resulting in a skilled or highly skilled population. Household and personal income levels are also either positively or adversely affected by education levels.

Of the total number of people in the Moqhaka LM, those aged 20 years and older, 5,5% have completed primary school, 36% have some secondary education, 27,8% have completed matric and 8,6% have some form of higher education. 5,4% of those aged 20 years and older have no form of schooling.

The 2011 data for the Fezile Dabi DM is consistent with that of the Moqhaka LM but there is a decline in the data from the 2011 Census to the 2016 Community Survey for those aged 20 years and older with no schooling (6,7%) and higher education (7,8%) and a rise in persons with matric (31,4%).

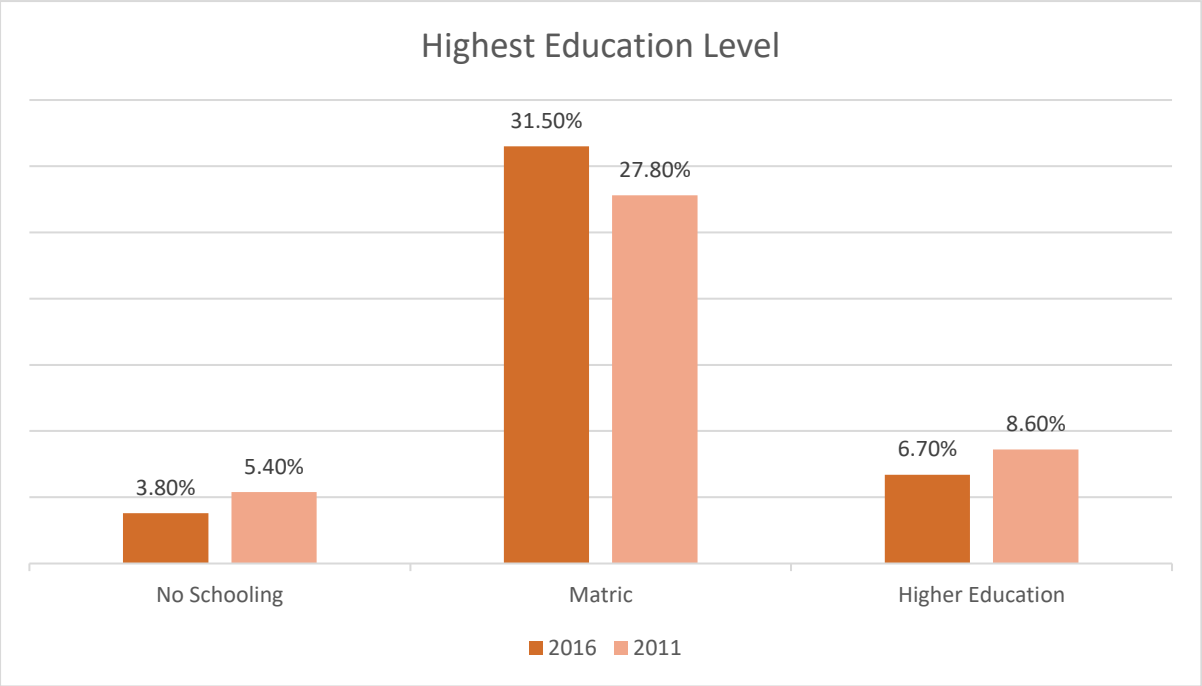


Figure 4.16: Moqhaka LM Highest Education Level (Census, 2011 and 2016).

4.6.7. Employment

The employment profile of an area is an important indicator of human development, as poverty and unemployment are closely correlated. The quality of labour is reflected, amongst other things, by the educational profile of the economically active population and the availability of training facilities in the region. The term labour force refers to those people who are available for employment in a certain area. According to Statistics South Africa, the definitions of the following employment indicators are:

- Economically active person: "A person of working age (between 15 and 65 years inclusive) who is available for work, and is either employed, or is unemployed but has taken active steps to find work in the reference period."
- Employed: "Those who performed work for pay, profit or family gain for at least one hour in the seven days prior to the interview or who were absent from work during these seven days but did have some form of paid work to return to."
- Official and expanded definition of unemployment: "The unemployed are those people within the economically active population who: (a) did not work during the seven days prior to the interview, (b) want to work and are available to start work within two weeks of the interview, and (c) have taken active steps to look for work or start some form of self-employment in the four weeks prior to the interview."
- Labour force: "All employed and unemployed persons of working age".
- Unemployment rate: "The percentage of the economically active population that is unemployed."

The employment profile of an area is also an important indicator of the level of disposable income and subsequently the expenditure capital of the residing population.

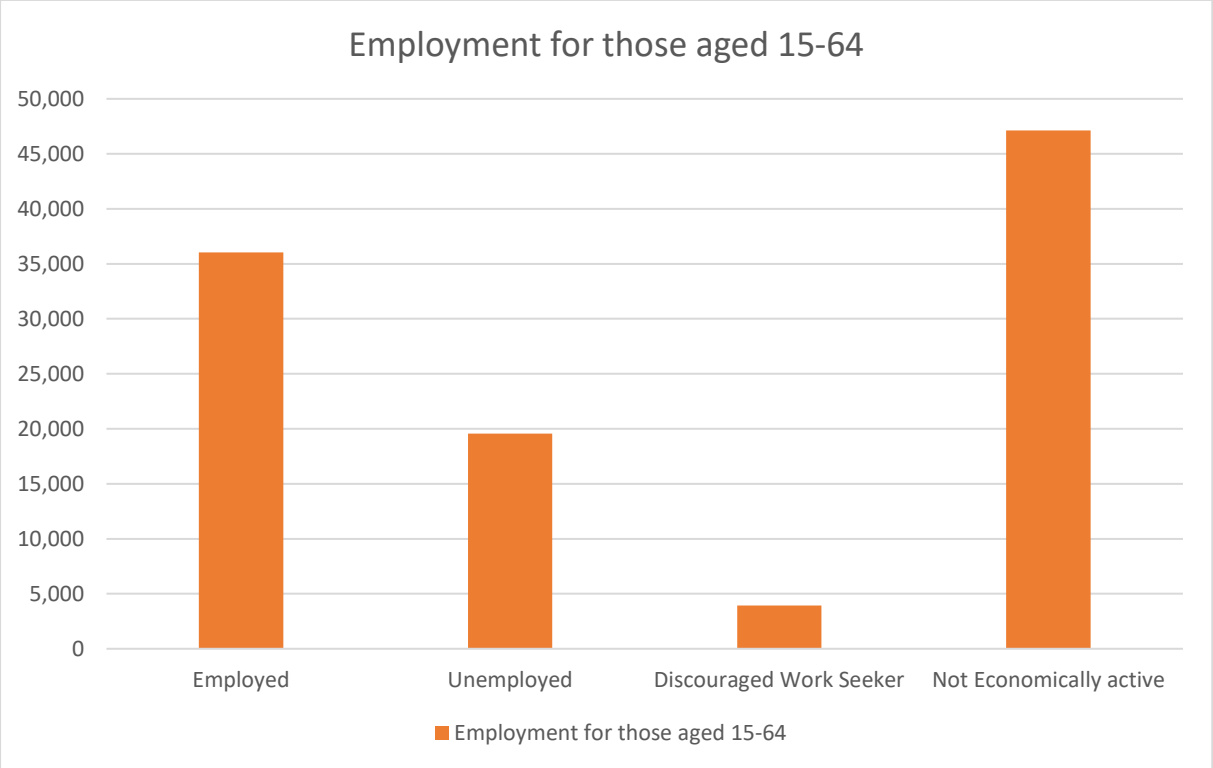


Figure 4.17: Employment Statistics for the Moqhaka LM (Statssa 2011).

In the Moqhaka LM there are 55 594 economically active (employed or unemployed but looking for work) people, and of these 35,2% are unemployed. Of the 27 349 economically active youth (15–34 years) in the area, 47,2% are unemployed.

In order to fully understand the employment levels within an area it is also important to gain an understanding of the type of employment. Specifically, whether the employed population are employed in the formal or informal sector. The informal sector refers to that portion of the economy that is not taxed or monitored by government. The contribution made by the informal sector also does not contribute towards a country's Gross Domestic Product (GDP) or Gross National Product (GNP). South Africa's informal sector provides income for more than 2.5 million workers and business owners, with approximately 1 in every 6 employed South African's being employed in the informal sector.

The figure below provides an overview of the key sectors that are providing employment to the people in the district. This data is compared with a combined average of related data from across all the districts in 17.6% of the district's employed population, which is higher than the SA District average, followed by community and social services and agriculture, hunting and forestry. Electricity, gas and water sectors are providing the least employment in the district, at below 1%, which is in line with the SA District average.

However, measures must be taken to explore the potential that these and other sectors such as manufacturing, construction, etc can be assessed to determine their potential to create more jobs in the district.

The creation of employment opportunities within the formal sector as a result of the development of `Naos Solar PV Project Two could therefore contribute towards growing employment within the formal sector in both the LM and DM, which could lead to greater levels of job security than may typically be associated with employment in the informal sector.

4.6.8. Annual Household Income Levels

In order to determine the population's standard of living, as well as their ability to pay for basic services, the income levels of the employed population are analysed. Household income levels are one avenue for determining poverty levels in a community. Households that have either no income or low income fall within the poverty level (R0 – R38 400 per annum), indicating the difficulty to meet basic need requirements. Middle-income is classified as earning R38 401 – R307 200, and high income is classified as earning R307 201 or more per annum.

Poverty levels prevalent within a particular area can be attributed with social consequences such as an inability to pay for basic needs and services, which in turn has influence on an individuals' standard of living. The Moqhaka LM has a very large portion of households live within the poverty level (67,4%) which has an annual income of less than R38 200. Only 2,7% of the households have an annual income of more than R307 201.

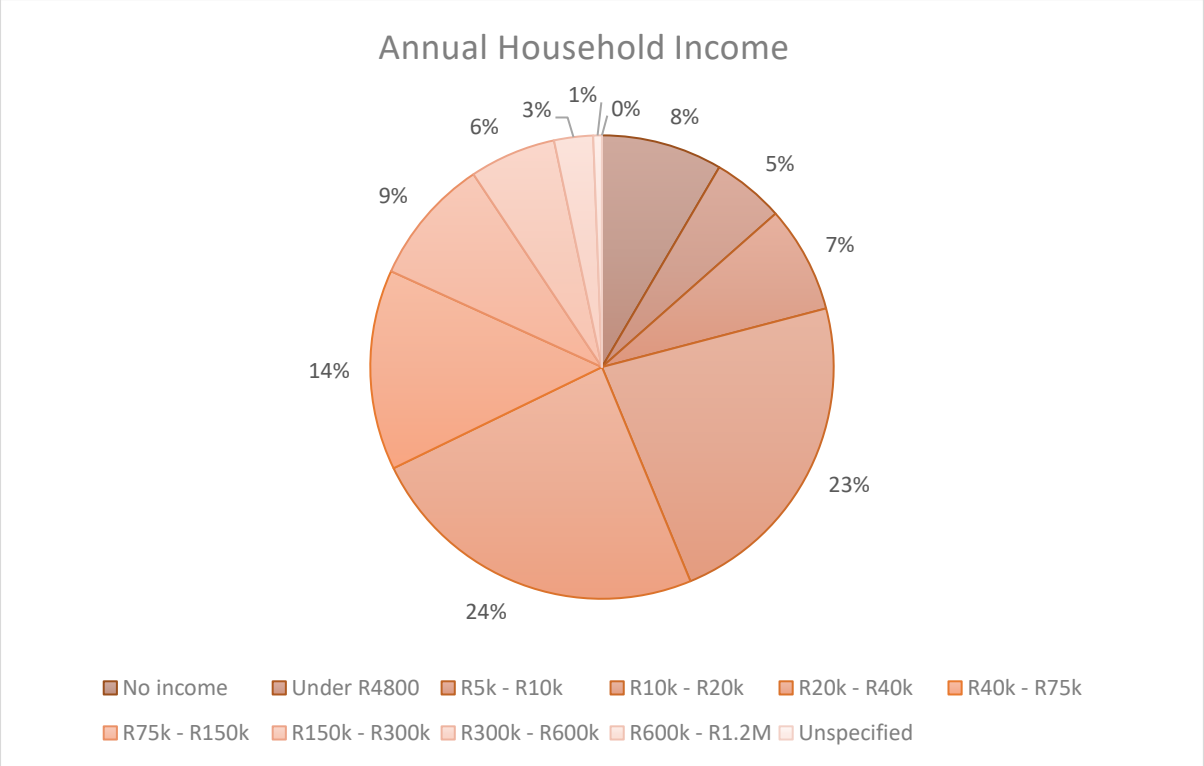


Figure 4.18: Average Household Income for the Moqhaka LM (Statssa 2011).

4.6.9. Economic Activities

Apart from the dominant role agriculture plays in the region, no other significant economic activity exists. The Moqhaka area, like the rest of the Fezile Dabi DM, is not considered as a primary tourist destination, although the area is increasingly becoming a favourite weekend destination. The hunting and guesthouse industries displayed an exceedingly rapid growth the past few years. Recreation areas and facilities are predominantly confined to the urban areas. The Kroonpark recreation and holiday resort in Kroonstad attracts interest throughout the region.

Viljoenskroon is located in an area of agricultural significance and mainly provides services in this regard to the surrounding rural areas. Viljoenskroon functions as a satellite town for residential purposes due to its strategic location in the proximity of the Vaal Reefs mines as well as the Orkney/Stilfontein mining areas in the North West Province. These towns have the opportunity for future growth based on industrial development, mining and tourism.

4.6.10. Health

South Africa's health sector is most concerned with communicable, non-communicable, pre-natal and maternal, and injury-related conditions. The Free State Department of Health has identified preventative health as a key priority in combating disease through community participation, public advocacy, and health screening in order to prevent morbidity and mortality.

The Moqhaka LM has indicated in the 2020-2021 Final IDP Review that the municipality is experiencing a shortage of health personnel, more especially doctors.

4.6.11. Households

The table and figure below indicate that the population of the municipality has decreased by 4.4% from 167 892 in 2001 to 160 532 persons in 2011. The community survey conducted during 2016 indicated that the population once again decreased with 3.61% to 154 732. Contrary to the above, the number of households increased by 10.0% from 41 514 in 2001 to 45 661 and increased again with 17.39% to 53 601 according to the Community Survey results of 2016.

An average decline of population by 4% from 2001 may not be attributed to specific variables which can be as a result of opportunistic diseases, migration as a result of job opportunities and even studies at tertiary institutions where-after most people don't come back to the municipality as they seek job opportunities.

The figure below shows that the average household size has also decreased from 3,5 people per household during the 2011 Census to 2.9 people per household during the community survey of 2016.

4.6.12. Access to Basic Services

Basic services such as electricity, water and sanitation, and refuse and waste removal are considered critical for the improvement of people's quality of life, and adequate supplies of basic services are also necessary to ensure life, well-being, and human dignity (Stats SA, 2017). Individuals' rights to basic services are largely enshrined in Section 24 of the Constitution which states that everyone has the right to an environment that is not harmful to their health or well-being. The accessibility of basic services is closely related to social inclusion and social capital, and the failure of municipalities to deliver services can have a detrimental impact on social and economic development (IDASA, 2010 in Stats SA, 2017). In terms of Section 73 of the Local Government Municipal Systems Act (No. 32 of 2000), municipalities have a general duty to give effect to the provisions of the Constitution and give priority to the basic needs of the local community, promote the development of the local community, and ensure that all members of the local community have access to at least the minimum level of basic municipal services. In addition, municipal services must be equitable and accessible, be provided in a manner that is conducive to the prudent, economic, efficient and effective use of available resources, and the improvement of standards of quality over time, be financially sustainable, be environmentally sustainable, and be regularly reviewed with a view to upgrading, extension and improvement. Table 4.4 provides the classification of infrastructure quality and different levels of service provision developed by Statistics South Africa following World Bank studies (Stats SA, 2017).

Table 4.4: Classification of infrastructure quality (Stats SA, 2017).

Service Level	Water	Sanitation	Solid Waste	Electricity
None	No access to piped water.	No sanitation.	No facilities / dump anywhere	No access to electricity
Minimal	Communal standpipe >200m.	Bucket toilets.	Communal / own refuse dump.	Generator / solar
Basic	Communal standpipe <200m	Pit toilet without ventilation pipe.	Communal container / collection point	Access to electricity don't pay for
Intermediate	Piped water in the yard.	Ventilated Improved Pit (VIP) latrine toilet, Chemical, or ecological toilets.	Removed less than once per week.	Connected to source and paid for
Full	Piped water in dwelling	Conventual waterborne	Removed once per week	In-house pre- and post-paid meters.

Access to basic services is assessed at a household level. An overview of households within the Moqhaka LM's access to basic services is described in the following sub-sections.

4.6.12.1. Access to Basic Services

According to the Moqhaka LM, households with access to piped (tap) water inside the dwelling and yard showed a positive movement and increased from 76.6% in 1996 to 94.2% in 2011, whilst piped water outside the yard decreased 6.8% over the same period.

The 2016 Community Survey defined piped water as: -

- Piped (tap) water inside the dwelling/house
- Piped (tap) water inside yard
- Piped water on community stand
- Neighbour's tap
- Public/communal tap.

The 2016 survey showed approximately 2% increase from the 2011 Census.

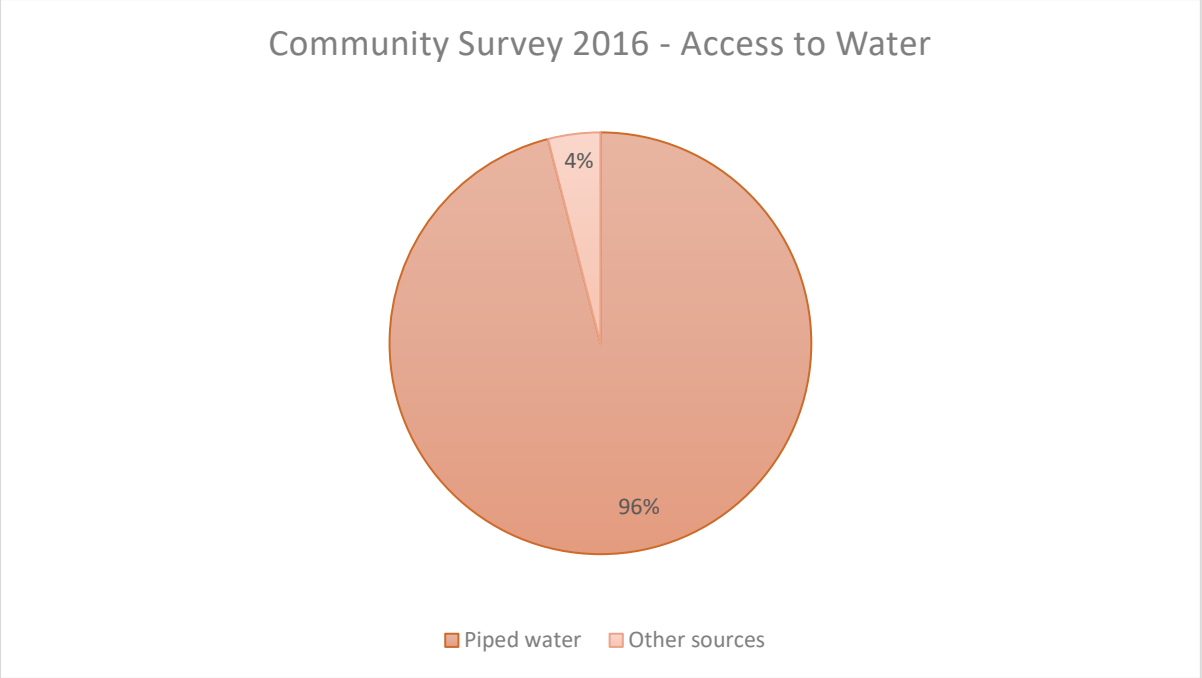


Figure 4.19: Moqhaka LM access to water – Community Survey 2016.

4.6.12.2. Access to Sanitation

According to the Moqhaka LM significant progress has also been made in respect of access to sanitation whereby households with flush/chemical toilets increased from 53.6% in 1996 to 88.5% in 2011. The percentage of households utilising pit latrines and bucket toilets declined in the past 15 years. The 2001 Census definition sanitation systems compared to that of the 2016 Community Survey is shown in table 4.5 below:

Table 4.5: Sanitation Stats SA description.

Flush/Chemical Toilet	
2011 Description	**2016 Description**
• Flush toilet (connected to sewerage system) • Flush toilet (with septic tank) • Chemical toile	• Flush toilet connected to a public sewerage system • Flush toilet connected to a septic tank or conservancy tank • Chemical toilet
Other	
2011 Description	**2016 Description**
• Pit toilet with ventilation (VIP) • Pit toilet without ventilation • Bucket toilet • Other	• Pit latrine/toilet with ventilation pipe • Pit toilet/toilet without ventilation pipe • Ecological toilet (e.g., urine diversion, Enviro Loo, etc.) • Bucket toilet (collected by municipality)

	• Bucket toilet (emptied by household)

Due to the abovementioned changes to the descriptions used it was necessary to show the 2016 results in a different figure.

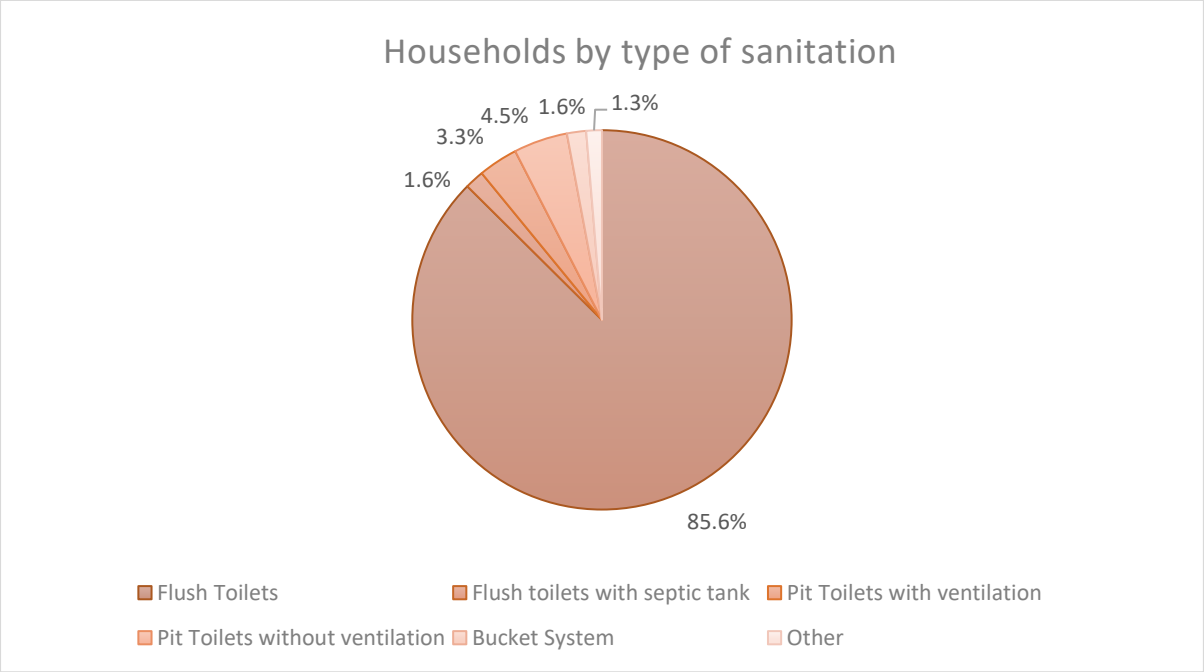


Figure 4.20: Moqhaka LM access to sanitation (Census, 2011).

The 2016 Community Survey results shown in the figure below and shows a further increase in access to sanitation.

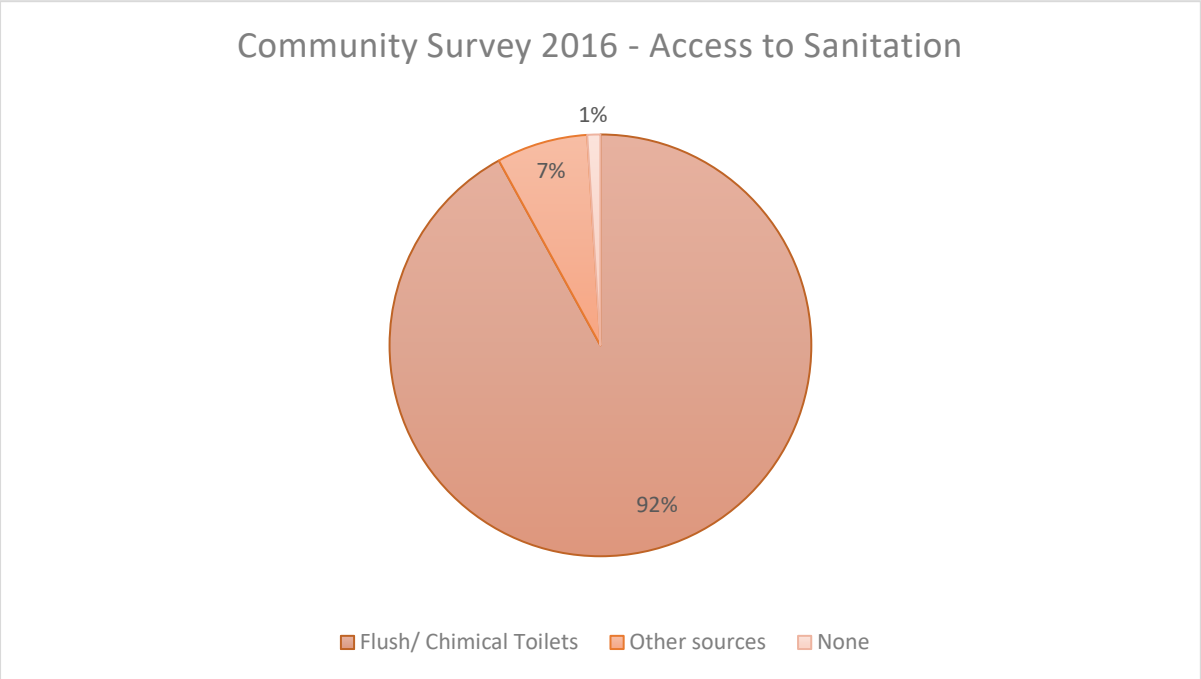


Figure 4.21: Moqhaka LM access to sanitation – Community Survey 2016.

4.6.12.3. Access to Electricity

Energy is required for cooking, heating, and lighting purposes. Individuals' access to different energy sources for cooking, heating, and lighting purposes is significant, as the burning of fuel sources such as wood, coal, and / or animal dung over extensive periods of time could result in negative health impacts for household members. Health impacts would be most significantly experienced by those vulnerable members of society, such as young children, pregnant women, and the elderly.

The 2011 Census information shows that more households utilise electricity for heating, lighting and cooking compared to the status quo in 1996. 93.3% (up by 34.3%) of households used electricity for lighting, 88.9% (+44.1%) for cooking and 64.8% (+26.8%) for heating in 2011 compared to 1996.

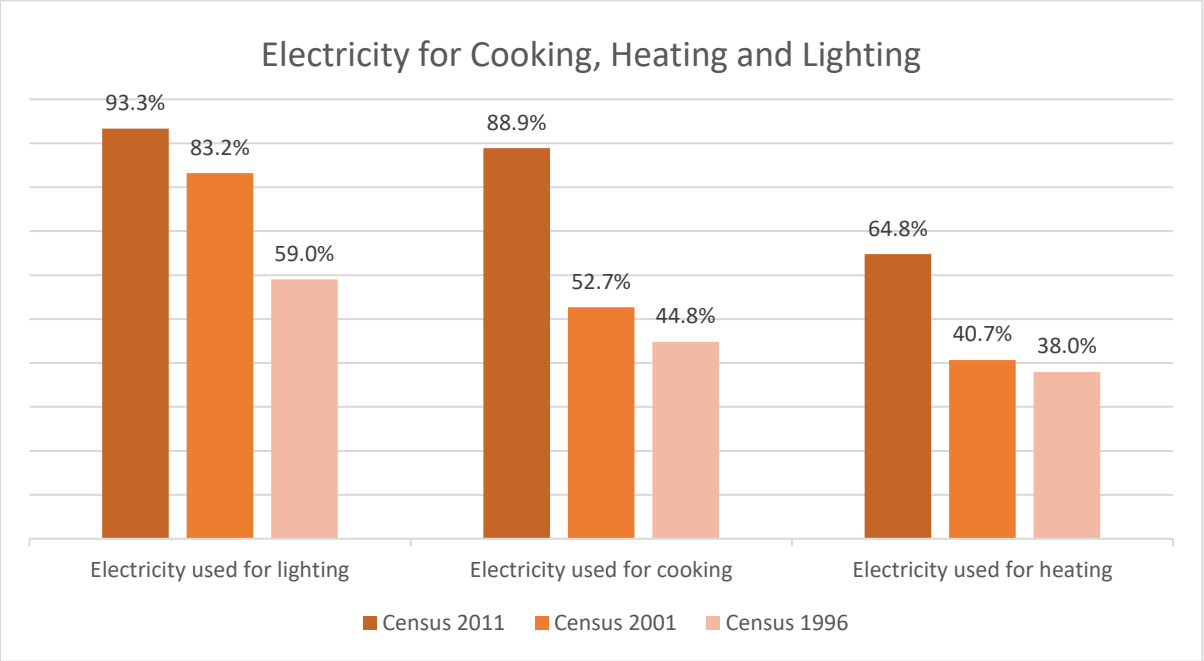


Figure 4.22: Moqhaka LM households using electricity.

The 2016 descriptions used in the community survey for electricity is as follows:

Connected to electricity (2016)

- In-house conventional meter
- In-house prepaid meter
- Connected to other source for which the household pays (e.g., connected to neighbour's line and paying neighbour, paying landlord)
- Connected to other source which the household is not paying for (e.g. connected to neighbour's line and not paying neighbour)

Other Sources for electricity

- Generator
- Solar home system
- Battery
- Other

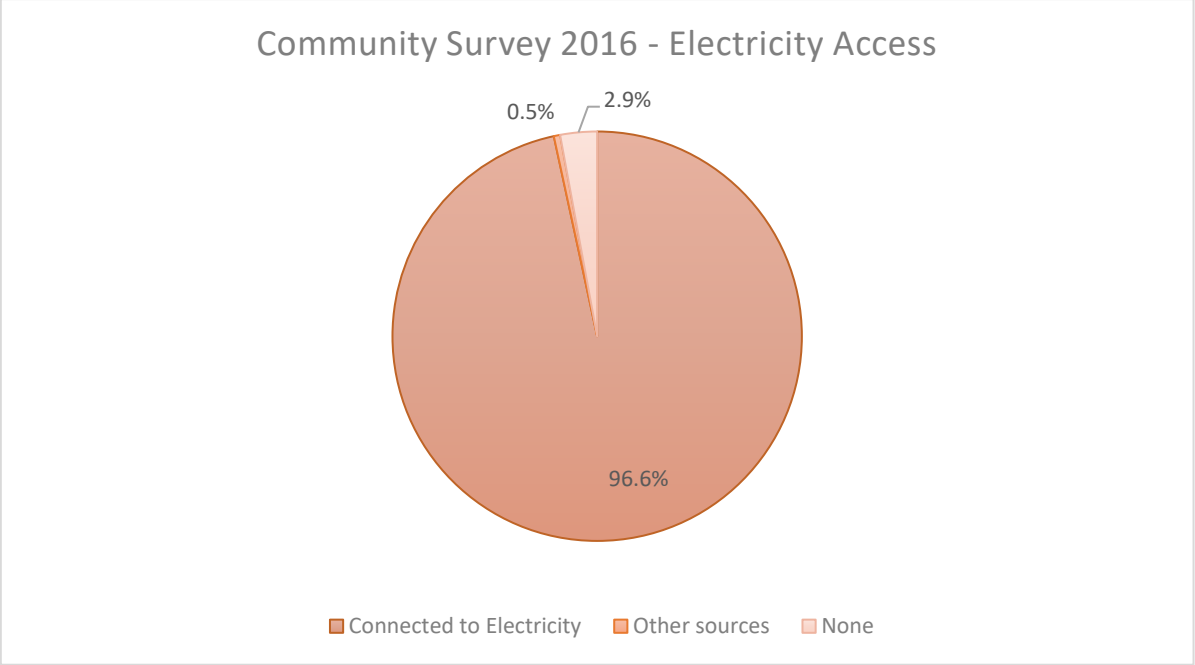


Figure 4.23: Moqhaka LM Electricity access: Community Survey 2016.

4.6.12.4. Access to Refuse Removal

In respect of access to solid waste removal services of the Moqhaka LM, 85.6% of households in 2011 had their refuse removed at least once a week showing a 16.6% increase compared to 1996. Households utilising their own or communal refuse dumps and with no access to solid waste removal services shows a comparative decline over the same period.

No access to refuse removal information was provided for the 2016 Community Survey. The figure below shows the information of the 2011 Census.

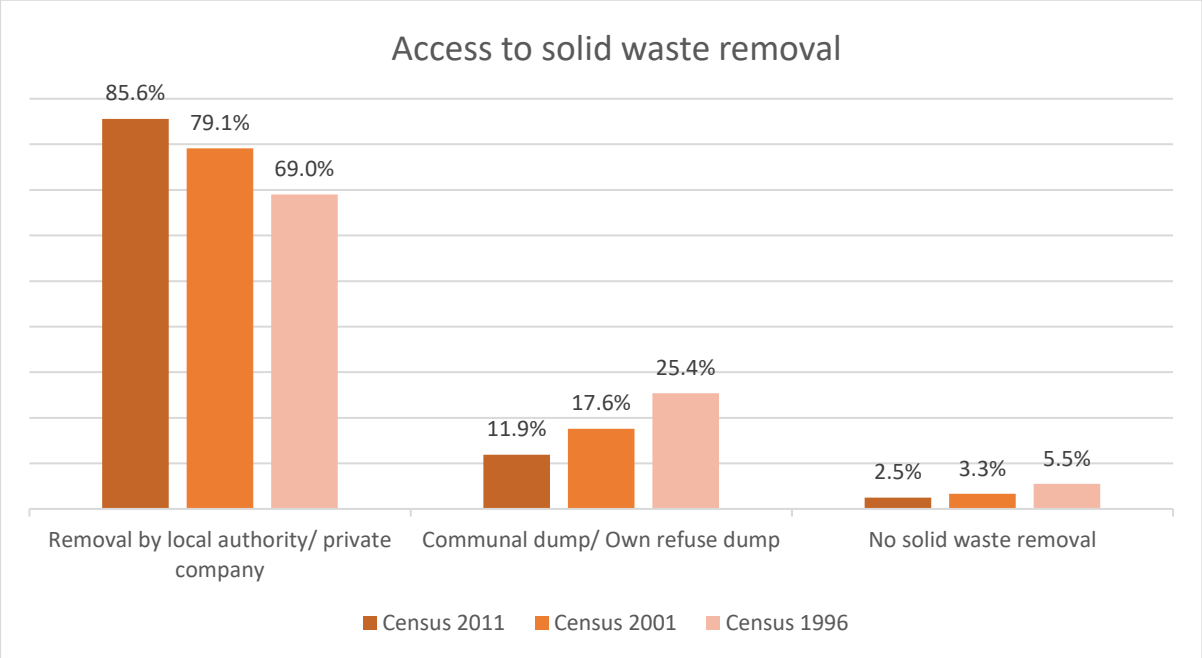


Figure 4.24: Moqhaka LM households by type of solid waste.

4.6.13. Baseline Summary

In summary, the area was found to have the following socio-economic characteristics:

- The project is proposed within the Free State Province, although is the third-largest province in South Africa, it has the second-smallest population and the second-lowest population density. It covers an area of 129 825km² and has a population of 2 834 714 – 5.1% of the national population. Languages spoken include Sesotho (64.4%), Afrikaans (11.9%) and Zulu (9.1%). The Free State Province contributes 5.4% to South Africa's total gross domestic product (2006).
- The project is proposed within the Moqhaka LM and the Fezile Dabi DM.
- The Moqhaka LM covers an area of 7 925km² and comprises of five towns: Kroonstad, Renovaal, Steynsrus, Vierfontein, Viljoenskroon. Kroonstad is the largest of the towns within the LM and is also the administrative centre of the LM.
- Between 2011 and 2016 the Moqhaka LM experienced a population decline of 0.8% from 160 532 to 154 732.
- The LM is female dominated at 50.49%.
- Black Africans comprise the predominant population group within the Moqhaka LM, the Fezile Dabi District Municipality, and the Free State Province.
- The Moqhaka LM, Fezile Dabi DM, and Free State Provincial population age structures are youth dominated. A considerable proportion of the respective populations therefore comprise individuals of the economically active population between the ages of 15 – 64.
- The dependency ratio of the LM was 50.5 in 2011, which is consistent with that of the DM and the Free State Province but is much higher than the National average of 34.5.
- The 2011 data for the Fezile Dabi DM is consistent with that of the Moqhaka LM but there is a decline in the data from the 2011 Census to the 2016 Community Survey for those aged 20 years and older with no schooling (6,7%) and higher education (7,8%) and a rise in persons with matric (31,4%).
- In the Moqhaka LM there are 55 594 economically active (employed or unemployed but looking for work) people, and of these 35,2% are unemployed. Of the 27 349 economically active youth (15–34 years) in the area, 47,2% are unemployed.
- The Moqhaka LM has a very large portion of households live within the poverty level (67,4%) which has an annual income of less than R38 200. Only 2,7% of the households have an annual income of more than R307 201.
- Apart from the dominant role agriculture plays in the region, no other significant economic activity exists. The Moqhaka area, like the rest of the Fezile Dabi DM, is not considered as a primary tourist destination, although the area is increasingly becoming a favourite weekend destination. Other economic activities include: transport services, business services and mining.
- The Moqhaka LM has indicated in the 2020-2021 Final IDP Review that the municipality is experiencing a shortage of health personnel, more especially doctors.
- The majority (88,7%) of households within the Moqhaka LM comprise of formal dwellings.
- The majority of households within the Moqhaka LM are well services with regards to electricity, water, sanitation and refuse removal.

5. KEY CONSIDERATIONS FOR PV SOLAR POWER PLANTS

While no industry sector Environmental, Health and Safety (EHS) Guidelines have been developed for PV Solar Power, the International Finance Corporation (IFC) has published a Project Developer's Guide to Utility-Scale Solar Photovoltaic Power Plants (IFC, 2015). Section 8 of the Project Developer's Guide pertains to Permits, Licensing and Environmental Considerations, and states that in order to deliver a project which will be acceptable to international lending institutions, environmental and social assessments should be carried out in accordance with the requirements of the key international standards and principles, namely the Equator Principles and IFC's Performance Standards (IFC PS).

Some of the key environmental considerations for solar PV projects contained within the Project Developer's Guide are provided below:

5.1. Construction Phase Impacts

Construction activities lead to temporary air emissions (dust and vehicle emissions), noise related to excavation, construction and vehicle transit, solid waste generation and wastewater generation from temporary building sites and worker accommodation. In addition, Occupational Health and Safety (OHS) is an issue that needs to be effectively managed during construction in order to minimise the risk of preventable accidents leading to injuries and / or fatalities. Proper OHS risk identification and management measures should be incorporated in every project's management plan and standard Engineering, Procurement and Construction (EPC) contractual clauses.

5.2. Water Usage

Adequate provision of water will be a prerequisite for the development. Water for the proposed development will most likely be obtained from ground water resources, or alternatively from the local municipality. The estimated maximum amount of water required during construction is 1 200m³ per month during the 12-18 months of construction. The estimated maximum amount of water required during the facility's 20 years of production is 4 200m³ per annum. Most of this usage is for the cleaning of the solar panels. Since each panel requires approximately 2 litres of water for cleaning, the total amount of ~500 000 panels will require 1 000 000 litres per wash. It is estimated that the panels may only need to be washed twice per annum, but provision is made for quaternary cleaning (March, May, July, and September). This totals approximately 4,000,000 litres per annum for washing, and allows 200,000 litres per annum (or 548 litres per day) for toilet use, drinking water, etc. This total to approximately 4 200m^3 of water required per annum.

5.3. Land Matters

As solar power is one of the most land-intensive power generation technologies, land acquisition procedures and in particular the avoidance or proper mitigation of involuntary land acquisition / resettlement are critical to the success of the project. This includes land acquired either temporarily or permanently for the project site itself and any associated infrastructure – i.e., access roads, powerlines, construction camps (if any) and switchyards. If involuntary land acquisition is unavoidable, a Resettlement Action Plan (RAP) (dealing with physical displacement and any associated economic displacement) or Livelihood Restoration Plan (LRP) (dealing with economic displacement only) will be required. This is often a crucial issue with respect to local social license to operate, and needs to be handled with due care and attention by suitably qualified persons.

No involuntary land acquisitions are foreseen for the purpose of this project.

5.4. Landscape and Visual Impacts

Key impacts can include the visibility of the solar panels within the wider landscape and associated impacts on landscape designations, character types and surrounding communities. Common mitigation measures to reduce impacts can include consideration of layout, size and scale during the design process and landscaping / planting in order to screen the modules from surrounding receptors. Note that it is important that the impact of shading on energy yield is considered for any new planting requirements. Solar panels are designed to absorb, not reflect, irradiation. However, glint and glare should be a consideration in the environmental assessment process to account for potential impacts on landscape / visual and aviation aspects.

5.5. Ecology and Natural Resources

Potential impacts on ecology can include habitat loss / fragmentation, impacts on designated areas and disturbance or displacement of protected or vulnerable species. Receptors of key consideration are likely to include nationally and internationally important sites for wildlife and protected species such as bats, breeding birds and reptiles. Ecological baseline surveys should be carried out where potentially sensitive habitat, including undisturbed natural habitat, is to be impacted, to determine key receptors of relevance to each site. Mitigation measures can include careful site layout and design to avoid areas of high ecological value or translocation of valued ecological receptors. Habitat enhancement measures could be considered where appropriate to offset adverse impacts on sensitive habitat at a site, though avoidance of such habitats is a far more preferable option.

5.6. Cultural Heritage

Potential impacts on cultural heritage can include impacts on the setting of designated sites or direct impacts on below-ground archaeological deposits as a result of ground disturbance during construction. Where indicated as a potential issue by the initial environmental review / scoping study, field surveys should be carried out prior to construction to determine key heritage and archaeological features at, or in proximity to, the site. Mitigation measures can include careful site layout and design to avoid areas of cultural heritage or archaeological value and implementation of a ‘chance find’ procedure that addresses and protects cultural heritage finds made during a project’s construction and/or operation phases.

5.7. Transport and Access

The impacts of transportation of materials and personnel should be assessed in order to identify the most appropriate transport route to the site while minimising the impacts on project-affected communities. The requirement for any oversized vehicles / abnormal loads should be considered to ensure access is appropriate. Onsite access tracks should be permeable and developed to minimise disturbance to agricultural land. Where project construction traffic has to traverse local communities, traffic management plans should be incorporated into the environmental and social management plan and EPC requirements for the project.

5.8. Drainage / Flooding

A review of flood risk should be undertaken to determine if there are any areas of high flood risk associated with the site. Existing and new drainage should also be considered to ensure run-off is controlled to minimise erosion.

5.9. Consultation and Disclosure

It is recommended that early-stage consultation is sought with key authorities, statutory bodies, affected communities and other relevant stakeholders. This is valuable in the assessment of project viability, and may guide and increase the efficiency of the development process. Early consultation can also inform the design process to minimise potential environmental impacts and maintain overall sustainability of the project. The authorities, statutory bodies and stakeholders that should be consulted vary from country to country but usually include the following organisation types:

- Local and / or regional consenting authority.
- Government energy department / ministry.
- Environmental agencies / departments.
- Archaeological agencies / departments.
- Civil aviation authorities / Ministry of Defence (if located near an airport).
- Road's authority.
- Health and safety agencies / departments.
- Electricity utilities.
- Military authorities.

Community engagement is an important part of project development and should be an on-going process involving the disclosure of information to project-affected communities. The purpose of community engagement is to build and maintain over time a constructive relationship with communities located in close proximity to the project and to identify and mitigate the key impacts on project-affected communities. The nature and frequency of community engagement should reflect the project's risks to, and adverse impacts on, the affected communities.

5.10. Environmental Management Plan (EMP)

Whether or not a Basic Assessment (BA) has been completed for the site, an EMP should be compiled to ensure that mitigation measures for relevant impacts of the type identified above (and any others) are identified and incorporated into project construction procedures and contracts. Mitigation measures may include, for example, dust suppression during construction, safety induction, training and monitoring programs for workers, traffic management measures where routes traverse local communities, implementation of proper waste management procedures, introduction of periodic community engagement activities, implementation of chance find procedures for cultural heritage, erosion control measures, fencing off any vulnerable or threatened flora species, etc. The EMP should indicate who will be responsible for implementing each action, and how this will be monitored and reported on at the project level. The plan should be in line with the nature and type of impacts identified.

6. SOCIAL IMPACT ASSESSMENT

This section provides a detailed description and assessment of the potential social impacts that were identified during the Scoping process for the detailed design and construction, operation, and decommissioning phases of Naos Solar PV Project Two.

6.1. Design and Construction Phase

The design and construction phase are expected to take approximately 12 to 18 months to complete. It is anticipated that the following activities would be included and would form part of the detailed design and construction phase:

- **Pre-planning:** Several post-authorisation factors are expected to influence the final design of the facility and could result in small-scale modifications of the positioning of the PV array and / or associated infrastructure. The construction process is dynamic and unforeseen changes to the project specifications may occur. The final facility design is required to be approved by DFFE prior to any construction activities commencing on-site. Should any substantive changes or deviations from the original scope or layout of the project reflected in the BA process occur, DFFE would need to be notified thereof, and where applicable additional approval may need to be obtained.
- **Conduct surveys**: Prior to initiating construction, several surveys will be required. These include, but are not limited to confirmation of the micro-siting footprint (i.e., confirming the precise location of the PV panels, substation, and the plant's associated infrastructure), and a geotechnical survey, as well as any other surveys that may be required.
- **Procurement and employment**: At the peak of construction the project is likely to create up to 500 employment opportunities. These employment opportunities will be temporary, and will last for a period of approximately 12 to 18 months (i.e., the length of construction). Employment opportunities generated during the construction phase will include low skilled, semi-skilled, and skilled opportunities. Solar PV projects make use of large numbers of unskilled and semi-skilled labour so there will be good opportunity to use local labour. The injection of income into the area in the form of wages will represent an opportunity for the local economy and businesses in the area. Most of the labour force is expected to be sourced from the surrounding towns. No labourers will be accommodated on-site during the construction period.
- **Establishment of an access road to the site:** Access to the facility will be obtained via a gravel road from the Vermaasdrift, S643, R59 and R501 roads. An internal site road network will also be required to provide access to the solar field and associated infrastructure. The access and internal roads will be constructed within a 12-meter corridor. The main access road providing direct access to the project will be up to 8m wide and 6km long. The final layout will be determined following the identification of site related sensitivities.
- **Undertake site preparation:** Site preparation activities will include clearance of vegetation. These activities will require the stripping of topsoil which will need to be stockpiled, backfilled and / or spread on site.

- **Transport of components and equipment to site:** The national, regional, secondary and proposed internal access roads will be used to transport all components and equipment required during the construction phase of the solar facility. Some of the components (i.e., substation transformer) may be defined as abnormal loads in terms of the National Road Traffic Act (No. 93 of 1996) (NRTO) by virtue of the dimensional limitations. Typical civil engineering construction equipment will need to be brought to the site (e.g., excavators, trucks, graders, compaction equipment, cement trucks, etc.) as well as components required for the mounting of the PV support structures, construction of the substation and site preparation.
- **Establishment of laydown areas on site:** Laydown and storage areas will be required for typical construction equipment. Once the required equipment has been transported to site, a dedicated equipment construction camp and laydown area will need to be established adjacent to the workshop area. The equipment construction camp serves to confine activities and storage of equipment to one designated area to limit potential impacts associated with this phase of development. The laydown area will be used for the assembly of the PV panels and the general placement / storage of construction equipment.
- **Erect PV arrays and construct substation and invertors:** The construction phase involves installation of the PV solar panels and structural and electrical infrastructure required for the operation of the facility. In addition, preparation of the soil and improvement of the access roads is likely to continue for most of the construction phase. For array installations, vertical support posts are driven into the ground. The posts will hold the support structures (tables) on which the PV modules would be mounted. Trenches are dug for the underground AC and DC cabling and the foundations of the inverter enclosures and transformers are prepared if necessary. Underground cables and overhead circuits connect the Power Conversion Stations (PCS) to the on-site AC electrical infrastructure and ultimately the solar facility's onsite substation. The construction of the substation will require a survey of the site, site clearing and levelling and construction of access road(s) (where applicable), construction of a level terrace and foundations, assembly, erection, installation and connection of equipment, and rehabilitation of any disturbed areas, and protection of erosion sensitive areas.
- **Establishment of ancillary infrastructure:** Ancillary infrastructure will include workshop, storage and laydown areas, gatehouse and security complex, as well as a temporary contractor's equipment camp. The establishment of the ancillary infrastructure and support buildings will require the clearing of vegetation and levelling of the development site, and the excavation of foundations prior to construction. Laydown areas for building materials and equipment associated with these buildings will also be required.
- **Construction of the power line:** A power line is constructed by surveying the power line route, constructing foundations for the towers, installing the towers, stringing the conductors, and finally rehabilitating disturbed areas and protecting erosion sensitive areas.
- **Undertake site rehabilitation:** Once construction is completed and all construction equipment has been removed, the site will be rehabilitated where practical and reasonable. In addition, on full commissioning of the solar facility, any access points which are not required during operation must be closed and rehabilitated accordingly.

The majority of social impacts associated with the project are anticipated to occur during the construction phase of development, and are typical of the type of social impacts generally associated with construction activities. Impacts associated with the design and construction phase of a project are usually of a short duration and temporary in nature, but could have long-term effects on the surrounding social environment if not planned or managed appropriately. It is therefore necessary that the design phase be conducted in such a manner so as not to result in permanent impacts associated with the ill placement of project components or associated infrastructure

6.1.1. Construction Phase Impacts Associated with Naos Solar PV Project Two

6.1.1.1. Direct and indirect employment opportunities and skills development

It is anticipated that at its peak the construction of the proposed project will result in the creation of approximately 500 employment opportunities. Of those employment opportunities likely to be generated, approximately 60% will accrue to low skilled workers, 25% to semiskilled workers, and 15% to skilled workers. Employment opportunities generated as a result of the project will be temporary in nature and will last for the duration of the construction period (i.e., approximately 12 to 18 months), while the skills developed through experience in the construction of the project will be retained by the community members involved. The project proponent anticipates that most of the general labour force will as far as possible be sourced from the local labour pool. Where relevant skills are unavailable from the local labour pool, these would need to be sought elsewhere. Solar PV projects make use of large numbers of unskilled and semi-skilled labour so there will be good opportunity to use local labour. The injection of income into the area in the form of wages will represent an opportunity for the local economy and businesses in the area.

In addition to direct employment opportunities associated with the construction of the project, a number of indirect employment opportunities will also be created. Indirect employment opportunities will predominantly be created in the service industry, through the opportunity for the provision of secondary services to the construction team. Services may include for example accommodation, catering, and laundry services. Indirect employment opportunities created as a result of the construction of the project would also be temporary in nature and would last for the duration of the construction period (i.e., approximately 12 to 18 months). While difficult to quantify, indirect employment opportunities are significant in that they provide greater opportunity for women to be included and benefit, albeit indirectly. Other indirect employment opportunities that will be created during construction relate to increased demand for transportation, equipment rental, sanitation and waste removal etc. which may benefit local service providers.

The creation of employment opportunities is considered to be of moderate magnitude given the levels of unemployment within the area, the low average income, and the fact that the majority of employment within the surrounding area is of a seasonal nature as it is associated with the agricultural sector.

Table 6.1: Impact assessment on direct and indirect employment opportunities.

Nature: The creation of direct and indirect employment opportunities during the construction phase of the project.		
	Without Enhancement	**With Enhancement**
Extent	Local (2)	Local (2)
Duration	Short duration (1)	Short duration (1)
Magnitude	Medium (2)	High (3)
Probability	Definite (4)	Definite (4)
Significance	Positive Low (22)	Positive Medium (36)
Status	Positive	Positive
Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources?	No loss of resource (1)	No loss of resource (1)
Cumulative Effect	Low (2)	Medium (3)
Can impact be enhanced?	Yes	
Enhancement: - A local employment policy should be adopted to maximise opportunities made available to the local labour force. - Labour should be sourced from the local labour pool, and only if the necessary skills are unavailable should labour be sourced from (in order of preference) the greater Moqhaka LM, Fezile Dabi DM, Free State Province, South Africa, or elsewhere. - Where feasible, training and skills development programmes should be initiated prior to the commencement of the construction phase. - As with the labour force, suppliers should also as far as possible be sourced locally. - As far as possible local contractors that are compliant with Broad-Based Black Economic Empowerment (B-BBEE) criteria should be used. - The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. - The recruitment process should ensure that all contracts should require compliance with relevant human rights legislation and ensure human rights are maintained.		
No-Go Alternative: - The current status quo is maintained due to no impact; however, the no-go option would signify that the positive impacts in terms of employment and economic benefits would be lost.		
Cumulative impacts: - Opportunity to decrease the local unemployment levels and increase the levels of income and spending power within the region.		

- Opportunity to upgrade and improve skills levels in the area. - Opportunity for local entrepreneurs to develop their businesses (which could result in the creation of additional employment opportunities, levels of income and spending power through sustainable growth).
Residual impacts: - Improved pool of skills and experience in the local area. - Economic growth for small-scale entrepreneurs. - Temporary employment during the construction phase will result in job losses and struggles for construction workers to find new employment opportunities.

6.1.1.2. Economic Multiplier effect

There are likely to be opportunities for local businesses and service providers to provide services and materials for the construction phase of the proposed project. The economic multiplier effects from the use of local goods and services will include, but is not limited to, the provision of construction materials and equipment, and workforce essentials such as catering services, trade clothing, safety equipment, ablution, accommodation, transportation and other goods. In addition, off-site accommodation may be required in nearby towns such as Viljoenskroon or Orkney for contract workers and certain employees. The increase in demand for goods and services may stimulate local business and local economic development (however locally sourced materials and services may be limited due to availability). There is likely to be a direct increase in industry and indirect increase in secondary businesses.

In terms of business opportunities for local companies, expenditure during the construction phase will create business opportunities for the regional and local economy. The increase in demand for new materials and services in the nearby area may stimulate local business and local economic development. There is likely to be a direct increase in industry and indirect increase in secondary businesses. The project proponent should source services needed from the local area as much as possible. These necessities should be sourced from nearby towns and local service providers. Potential opportunities for local economies, a decrease in current level of unemployment, and an increase in incomes will in turn stimulate further expenditure and sales within the local economies.

The injection of income into the area in the form of wages will represent an opportunity for the local economy and businesses in the area. Through the stimulation of employment and income, new demand may be created within local and regional economies. With increased income comes additional income for expenditure on goods and services supplied. Indirect impacts would occur as a result of the new economic development and would include new jobs at businesses that may support the construction workforce or provide project materials, and associated income. The intention should therefore be to maximise local labour employment opportunities, which is likely to have a positive impact on local communities and downstream benefits with regards to household income, education and other social aspects. Such benefits may however be limited given the short construction period (i.e., approximately 12 to 18 months).

Table 6.2: Economic multiplier effects impact assessment.

Nature: Significance of the impact from the economic multiplier effects from the use of local goods and services.		
	Without Enhancement	**With Enhancement**
Extent	Local-Regional (3)	Local-Regional (3)
Duration	Short term (1)	Short term (1)
Magnitude	Medium (2)	High (3)
Probability	Probable (3)	Definite (4)
Significance	Positive Low (22)	Positive Medium (39)
Status	Positive	Positive
Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources?	No loss of resource (1)	No loss of resource (1
Cumulative Effect	Low (2)	Medium (3)
Can impact be enhanced?	Yes	
Enhancement: - It is recommended that a local procurement policy is adopted to maximise the benefit to the local economy. - A database of local companies, specifically Historically Disadvantaged Individuals (HDIs) which qualify as potential service providers (e.g., construction companies, security companies, catering companies, waste collection companies, transportation companies etc.) should be created and companies listed thereon should be invited to bid for project-related work where applicable. - Local procurement is encouraged along with engagement with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods and products from local suppliers where feasible.		
No-Go Alternative: - The current status quo is maintained due to no impact; however, the no-go option would signify that the positive impacts in terms of the injection of an income into the area will be lost.		
Cumulative impacts: - Opportunity for local capital expenditure which has the potential to benefit the local service sector.		
Residual impacts: - Improved local service sector which will result in a growth in local business.		

6.1.1.3. Shared infrastructure

The economic multiplier effect will also influence on the investment of shared infrastructure between the project and the LM. The project may invest in the upgrade of infrastructure such as roads, stormwater and housing for workers which will lead to an uplift in the community involved with the project as well as the whole municipality. Small businesses can also tender and seek job creation and be involved in the upgrading of infrastructure as well as in the maintenance of this for the duration of these projects.

Table 6.3: Improvements on shared infrastructure.

Nature: Investment into upgrading and maintain shared infrastructure such as roads and stormwater infrastructure on farms may benefit farming operations		
	Without Enhancement	**With Enhancement**
Extent	Local-Regional (3)	Local-Regional (3)
Duration	Short term (1)	Short term (1)
Magnitude	Low (1)	Medium (2)
Probability	Probable (3)	Definite (4)
Significance	Low (11)	Low (26)
Status	Positive	Positive
Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources?	No loss of resource (1)	No loss of resource (1
Cumulative Effect	Low (2)	Medium (3)
Can impact be enhanced?	Yes	
Enhancement: - The project would contribute to an upgrade in the shared infrastructure of the LM as well as in the maintenance of this infrastructure. - The LM would be encouraged to participate in this maintenance and upgrade where it would be feasible for them to be involved. - A database of local companies, specifically Historically Disadvantaged Individuals (HDIs) which qualify as potential service providers (e.g., construction companies, security companies, catering companies, waste collection companies, transportation companies etc.) should be created (or sourced from the local Municipality, where available) and companies listed thereon should be invited to bid for project-related work where applicable and this would include the maintenance of this shared infrastructure.		
No-Go Alternative: - The current status quo is maintained due to no impact.		
Cumulative impacts:		

- Opportunity for local businesses and partners to be involved in the upgrade and maintenance of this shared infrastructure.
Residual impacts: - Improved local service sector which will result in a growth in local business.

6.1.1.4. Potential loss of productive farmland

A negative impact identified for the construction phase is the potential loss of productive farmland. The activities associated with the construction phase may have a potential impact in terms of the loss of available farmland for grazing as well as other agricultural activities. The current land uses of the identified area for the proposed Naos Solar PV Project Two are used for the grazing of livestock (cattle). The farm owner has entered into a lease agreement with Naos Solar PV Project Two (Pty) Ltd for the use of the land for the proposed Naos Solar PV Project Two, and the income from Naos Solar PV Project Two (Pty) Ltd will cover the impact of loss of income generated on the farms. The owner of Portion 2 of the Farm Waterford No. 573, on which the proposed Naos Solar PV Project Two will be developed, also indicated in an interview with the specialist that the potential loss of productive farmland won't have a negative economic impact on the farm, due to the income that the farmer will receive for the letting of the farmland.

Table 6.4: Assessment of potential impacts related to the potential loss of productive farmland.

Nature: The potential loss in productive farmland during the construction phase, due to factors such as the construction of roads, the preparation of foundations, power lines, offices etc.		
	Without Mitigation	**With Mitigation**
Extent	Site (1)	Site (1)
Duration	Short term (1)	Short term (1)
Magnitude	High (3)	Medium (2)
Probability	Probable (3)	Possible (2)
Significance	Negative Medium (39)	Negative Low (20)
Status	Negative	Negative
Reversibility	Barely reversible (3)	Partly reversible (2)
Irreplaceable loss of resources?	Medium (2)	Medium (2)
Cumulative Effect	Medium (3)	Low (2)
Can impact be mitigated?	Yes	-
Mitigation: - The proposed site for the Naos Solar PV Project Two needs to be fenced off prior to the construction phase and all construction related activities should be confined in this fenced off area.		

- Livestock grazing on the proposed site need to be relocated. - All affected areas, outside of the development footprint, which are disturbed during the construction phase, need to be rehabilitated prior to the operational phase and should be continuously monitored by the Environmental Control Officer (ECO). - Implement, manage and monitor a grievance mechanism for the recording and management of social issues and complaints.
No-Go Alternative: - The current status quo is maintained due to no impact.
Cumulative Impacts: - The cumulative impacts associated with the loss of productive farmland is the effect it has on the livelihoods of the farmers, their families and also the workers on the farms and their families. As indicated above this impacted can be mitigated.
Residual impacts: - The residual impacts for the potential loss of productive farmland are the overall loss of grazing for livestock.

6.1.1.5. Influx of jobseekers and change in population

Construction projects have the potential to attract jobseekers which may move into an area in search of employment opportunities. An influx of people looking for employment or other economic opportunities could result in increased pressure being placed on economic and social infrastructure, and a change in the local population. Population change refers to the size, structure, density as well as demographic profile of the local community.

An influx of jobseekers into an area, could lead to a temporary increase in the level of crime, cause social disruption and put pressure on basic services. This includes municipal services such as sanitation, electricity, water, waste management, health facilities, transportation and the availability of housing. It could also potentially create conflict between locals and outsiders due to potential differences in racial, cultural and ethnic composition. A further negative impact that could result due to an influx of jobseekers into an area is an increase in unemployment levels due to an oversupply of available workforce, particularly with respect to semi and unskilled workers.

Given the relatively small labour force required for the project (i.e., approximately 500 employment opportunities at the peak of construction), the short duration of the construction period (i.e., approximately 12 to 18 months), and the proximity of the site to the towns of Viljoenskroon and Orkney (from which most of the labour is likely to be sourced), the construction of the project is not anticipated to result in changes to the population within the site or its surrounds. In addition, since no man camps will be established on site, the potential for an influx of people into the area or change in population demographics is anticipated to be minimal. The labour force is therefore also not anticipated to place significant pressure on local resources and social networks, or existing services and infrastructure, as they would already be accessing services at their places of residence.

Table 6.5: Assessment of impacts from an influx of jobseekers and change in population in the study area.

Nature: In-migration of labourers in search of employment opportunities, and a resultant change in population, and increase in pressure on local resources and social networks, or existing services and infrastructure.		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (2)
Duration	Permanent (4)	Long term (3)
Magnitude	Medium (2)	Low (1)
Probability	Probable (3)	Probable (3)
Significance	Negative Medium (38)	Negative Low (17)
Status	Negative	Negative
Reversibility	Irreversible In the case of HIV/AIDS (4).	Irreversible In the case of HIV/AIDS (4).
Irreplaceable loss of resources?	Human capital plays a critical role in communities that rely on farming for their livelihoods. If workers with HIV/AIDS are contracted then yes, there will be a significant loss of resources (3).	Human capital plays a critical role in communities that rely on farming for their livelihoods. If workers with HIV/AIDS are contracted then yes, there will be a significant loss of resources (3).
Cumulative Effect	Medium (3)	Low (2)
Can impact be mitigated?	Yes	
Mitigation: - Develop and implement a local procurement policy which prioritises "locals first" to prevent the movement of people into the area in search of work. - Engage with local community representatives prior to construction to facilitate the adoption of the locals first procurement policy. - Provide transportation for workers (from Orkney or Viljoenskroon and surrounds) to ensure workers can easily access their place of employment and do not need to move closer to the project site. - As far as possible, working hours should be kept between daylight hours during the construction phase, and / or as any deviation that is approved by the relevant authorities. - Compile and implement a grievance mechanism. - Appoint a Community Liaison Officer (CLO) to assist with the procurement of local labour. - Prevent the recruitment of workers at the project site.		

- Implement, manage and monitor a grievance mechanism for the recording and management of social issues and complaints. - Establish clear rules and regulations for access to the proposed site. - Appoint a security company and implement appropriate security procedures to ensure that workers do not remain onsite after working hours. - Inform local community organisations and policing forums of construction times and the duration of the construction phase. - Establish procedures for the control and removal of loiterers from the construction site.
No-Go Alternative: - The current status quo is maintained due to no impact.
Cumulative Impacts: - Additional pressure on natural resources, services, infrastructure and social dynamics in the area due to an increase in people and change in population. - Possible increase in criminal activities and economic losses in area for property owners. - In the case of HIV/AIDS or unwanted pregnancies the impacts might be permanent and have permanent cumulative impacts on the affected individuals, families and the community.
Residual impacts: - Possibility of outside workers remaining in the area after construction is completed and subsequent pressures on local infrastructure, resources and services.

6.1.1.6. Safety and security impacts

The commencement of construction activities can be associated with an increase in crime within an area. The perceived loss of security during the construction phase of a project due to an influx of workers and / or outsiders to the area (as in-migration of newcomers, construction workers or jobseekers are usually associated with an increase in crime), may have indirect effects such as increased safety and security concerns for neighbouring properties, damage to property, increased risk of veld fire, stock theft, poaching, crime and so forth. All landowners have raised concerns regarding security in the area and have reiterated that crime in the area should not increase as a result of the project. A concern was raised regarding the location of the access to the site and the potential to open up the area as a thoroughfare.

Given the fact that a man camp will not be established onsite, and the labour force will therefore not permanently reside within the area, or have any reason to be onsite after hours, it is anticipated that the probability and significance of such safety and security impacts occurring will be reduced.

The project proponent should strive to develop and maintain good relationships and ongoing and open communication with neighbouring landowners. Suitable grievance control mechanisms must be developed and implemented, and the local community informed of the grievance mechanism to be followed. In addition, a security company must be appointed, and appropriate security measures implemented prior to the commencement of construction activities onsite.

Table 6.6: Assessment of safety and security impacts

Nature: Temporary increase in safety and security concerns associated with the influx of people during the construction phase.		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	High (3)	Medium (2)
Probability	Probable (3)	Unlikely (1)
Significance	Negative Medium (36)	Negative Low (18)
Status	Negative	Negative
Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources?	No loss of resources (1)	No loss of resources (1)
Cumulative Effect	Medium (3)	Low (2)
Can impact be mitigated?	Yes	
Mitigation: - As far as possible, working hours should be kept within daylight hours during the construction phase, and / or as any deviation that is approved by the relevant authorities. - Provide transportation for workers to prevent loitering within or near the project site outside of working hours. - 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. - The appointed EPC Contractor must appoint a security company to ensure appropriate security procedures and measures are implemented. - Access in and out of the construction site should be strictly controlled by a security company appointed to the project. - A CLO should be appointed as a grievance mechanism. A method of communication should be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process. - The EPC Contractor should implement a stakeholder management plan to address neighbouring farmer concerns regarding safety and security. - The project proposed must prepare and implement a Fire Management Plan; this must be done in conjunction with surrounding landowners. - The EPC Contractor must prepare a Method Statement which deals with fire prevention and management.		
No-Go Alternative:		

- The current status quo is maintained due to no impact.
Cumulative impacts: - Possible increase in crime levels (with influx of people) with subsequent possible economic losses. - Increased risk of veld fires if vegetation clearing is not appropriately implemented, monitored and maintained.
Residual impacts: - Financial losses for adjacent landowners.

6.1.1.7. Impacts on daily living and movement patterns

Project components and equipment will be transported to site using road transport. The gravel road off the Vermaasdrift, R59 and R501 roads provides the primary access to the area. Traffic utilising the road is mainly property owners. Local farmers and residents utilise this road to access their properties.

Increased traffic due to construction vehicles could cause disruptions to road users, the local community and increase safety hazards, especially on the main road that will be utilised. The use of local roads and transport systems may cause road deterioration and congestion. An increase of traffic from the rise in construction vehicles is a safety concern for other road users and local communities in the area. Impacts will be magnified since farm roads are not designed to carry heavy traffic and are prone to erosion. Noise, vibrations, dust and visual pollution from heavy vehicle traffic during the construction phase could also negatively impact local residents and road users.

The upgrading of access roads may damage the fences along the access road. Infrastructure such as roads and fencing should be maintained in the present condition and repaired immediately, if damaged as a result of construction activities. The contractor should be responsible for managing this impact on private property.

There are a few residents living in the nearby area, which will be impacted by the project. In terms of regional and local roads involved, the expectation is that the proponent should consult with the relevant roads agency to ensure that they do not contribute to the deterioration of roads without taking some responsibility for repairing the impact that their construction vehicles may have on the road during construction phase.

Table 6.7: Assessment of impacts on daily living and movement patterns.

Nature: Temporary increase in traffic disruptions and movement patterns during the construction phase.		
	Without Mitigation	**With Mitigation**
Extent	Local-Regional (3)	Local-Regional (3)
Duration	Short term (1)	Short term (1)
Magnitude	High (3)	Medium (2)
Probability	Probable (3)	Probable (3)
Significance	Negative Medium (36)	Negative Low (20)

Status	Negative	Negative
Reversibility	Partly reversible (2)	Partly reversible (1)
Irreplaceable loss of resources?	Marginal loss of resource (2)	No loss of resource (1)
Cumulative Effect	Low (1)	Low (1)
Can impact be mitigated?	Yes	

Mitigation:

- All vehicles must be road worthy, and drivers must be qualified, obey traffic rules, follow speed limits and be made aware of the potential road safety issues.
- Heavy vehicles should be inspected regularly to ensure their road worthiness.
- Provision of adequate and strategically placed traffic warning signs, that have to be maintained for the duration of the construction phase, and control measures along the Vermaasdrift and S643 roads and gravel road off the R59 and R501 roads to warn road users of the construction activities taking place for the duration of the construction phase. Warning signs must be always visible, especially at night.
- Implement penalties for reckless driving to enforce compliance to traffic rules.
- Avoid heavy vehicle activity during "peak" hours (when children are taken to school, or people are driving to work).
- The developer and EPC Contractor must ensure that all fencing along access roads is maintained in the present condition or repaired if disturbed due to construction activities.
- The developer and EPC Contractor must ensure that the roads utilised for construction activities are either maintained in the present condition or upgraded if disturbed due to construction activities.
- The EPC Contractor must ensure that damage / wear and tear caused by construction related traffic to the access roads is repaired before the completion of the construction phase.
- A method of communication must be implemented whereby procedures to lodge complaints are set out for the local community to express any complaints or grievances with the construction process.

No-Go Alternative:

- The current status quo is maintained due to no impact.

Cumulative impacts:

- Possible increased traffic and traffic disruptions impacting local communities.

Residual impacts:

- None anticipated.

6.1.1.8. Nuisance impacts (noise and dust)

Impacts associated with construction related activities include noise, dust, and possible disruption to adjacent properties. Site clearing activities increase the risk of dust and noise being generated, which can in turn negatively impact on adjacent properties. The movement of heavy construction vehicles and construction activities and equipment also have the potential to create noise at the project site,

as well along the Vermaasdrift, S643, R59 and R501 roads, and other local access roads. The primary sources of noise during construction would be from construction equipment, vehicle / truck traffic, and ground vibration. Noise levels can be audible over a large distance however are generally short in duration. Dust would be generated from construction activities as well as trucks / vehicles driving on gravel access roads. This impact will negatively impact sensitive receptors and could also potentially negatively impact surrounding land users. The impact of noise and dust on surrounding land users and local farmsteads can be reduced through the application of appropriate mitigation measures.

Table 6.8: Assessment of nuisance impacts (noise and dust)

Nature: Nuisance impacts in terms of temporary increase in noise and dust, and wear and tear on access roads to the site.		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (2)
Duration	Short term (1)	Short term (1)
Magnitude	High (3)	Medium (2)
Probability	Definite (4)	Probable (3)
Significance	Negative Medium (33)	Negative Low (20)
Status	Negative	Negative
Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources?	No loss of resource (1)	No loss of resource (1)
Cumulative Effect	Low Cumulative impact (2)	Low Cumulative impact (2)
Can impact be mitigated?	Yes	
Mitigation: - The movement of heavy vehicles associated with the construction phase should be timed to avoid weekends, public holidays, and holiday periods where feasible. - Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. - Ensure all vehicles are road worthy, drivers are qualified and are made aware of the potential noise and dust issues. - A CLO should be appointed, and a grievance mechanism implemented.		
No-Go Alternative: - The current status quo is maintained due to no impact.		
Cumulative impacts: - If damage to roads is not repaired, then this will affect other road users and result in higher maintenance costs for vehicles of road users.		

- Other construction activities in the area will heighten the nuisance impacts, such as noise, dust and wear and tear on roads.
Residual impacts: - Only damage to roads that is not fixed could affect road users.

6.1.1.9. Increased risk of potential veld fires

During the construction phase there is an increased risk of veld fires due to the presence of construction related activities as well as the presence of construction workers on site. The risk of veld fires poses further threats to the loss of livestock, crops and farmsteads in the area. This could result in the loss or damage of farm infrastructure and threaten human lives. All farmers that were interviewed for the purpose of this SIA expressed their concern regarding the risk of veld fires during the construction phase. They have all suggested that the necessary mitigation measures should be taken, the site needs to be equipped with the correct firefighting equipment and workers should be trained in firefighting and how to work with the equipment. The area of the site also needs to be fenced off, to keep construction related activities within the vicinity of the site. They also mentioned that the area around the farms and site's fences need to be cleared to ensure that veld fires that might occur won't jump to the neighbouring farms. For effective mitigation measures in this regard, see the mitigation measures given below.

Table 6.9: Assessment of potential impacts of increased risk of potential veld fires.

Nature: The potential loss of livestock, crops, and farmsteads in the area. This also includes the damage and loss of farm infrastructure and the threatening of human lives that are associated with the increased risk of veld fires.		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Site (1)
Duration	Short term (1)	Short term (1)
Magnitude	High (3)	Medium (2)
Probability	Probable (3)	Probable (3)
Significance	Negative Medium (36)	Negative Low (18)
Status	Negative	Negative
Reversibility	Partly Reversible (2)	Completely reversible (1)
Irreplaceable loss of resources?	Significant loss of resources (3)	Marginal loss of resource (2)
Cumulative Effect	Negligible (1)	Negligible (1)
Can impact be mitigated?	Yes	

Mitigation: - A firebreak should be implemented before the construction phase. The firebreak should be controlled and implemented around the perimeters of the project site. - Adequate fire-fighting equipment should be provided and readily available on site and all staff should be trained in firefighting and how to use the fire-fighting equipment. - No staff (except security) should be accommodated overnight on site and the contractor should ensure that no open fires are allowed on site. The use of cooking or heating implements should only be used in designated areas. - Contractors need to ensure that any construction related activities that might pose potential fire risks, are done in the designated areas where it is also managed properly. - Precautionary measures need to be taken during high wind conditions or during the winter months when the fields are dry. - The contractor should enter an agreement with the local farmers before the construction phase that any damages or losses during the construction phase related to the risk of fire and that are created by staff during the construction phase, are borne by the contractor.
No-Go Alternative: - The current status quo is maintained due to no impact.
Cumulative impacts: - There are no cumulative impacts because the potential losses can be compensated for.
Residual impacts: - The residual impacts include the impact on livelihoods and the income generated by the farming activities. The reduced carrying capacity due the loss of grazing fields. In the case thereof compensation need to be paid in the case of any damages and losses.

6.1.1.10. Visual and sense of place impacts

Intrusion impacts such as aesthetic pollution (i.e., building materials, construction vehicles, etc.), noise and light pollution, and impacts on the rural nature of the site will impact the "sense of place" for the local community. Construction related activities have the potential to negatively impact a local area's "sense of place". The alteration of the sense of place in view of the residents and road users will start during the construction phase and remain for the project's operational lifetime.

Given the nature of the surrounding area within which the project is proposed, the area is characterised by agricultural activities, the site is also well screened by existing vegetation and landscape features (i.e., most significantly within 2km of the site) it can be anticipated that the visual and sense of place impacts associated with the construction of the facility will be of low significance.

Table 6.10: Assessment of impacts on the sense of place

Nature: Intrusion impacts from construction activities will have an impact on the area's "sense of place".		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (2)
Duration	Short term (1)	Short term (1)

Magnitude	Low (1)	Low (1)
Probability	Definite (4)	Probable (3)
Significance	Negative Low (12)	Negative Low (9)
Status	Negative	Negative
Reversibility	Partly Reversible (2)	Completely reversible (1)
Irreplaceable loss of resources?	No loss of resources (1)	No loss of resources (1)
Cumulative Effect	Medium (2)	Low (1)
Can impact be mitigated?	Yes	
Mitigation: - Implement mitigation measures identified in the Visual Impact Assessment (VIA) prepared for the project. - As far as possible, limit noise generating activities to normal daylight working hours and avoid weekends and public holidays. - The movement of heavy vehicles associated with the construction phase should be timed to avoid weekends, public holidays, and holiday periods where feasible. - Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers. - All vehicles must be road-worthy, and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits. - Communication, complaints, and grievance channels must be implemented and contact details of the CLO must be provided to the local community in the study area.		
No-Go Alternative: - The current status quo is maintained due to no impact.		
Cumulative impacts: - Other construction activities in the area will heighten the intrusion impacts, such as noise, dust and aesthetic pollution and further negatively impact the area's 'sense of place'.		
Residual impacts: - None anticipated.		

6.2. Operational Phase

Naos Solar PV Project Two is anticipated to operate for a minimum of 20 years. The facility will operate continuously, 7 days a week, during daylight hours. While the solar facility will be largely self-sufficient, monitoring and periodic maintenance activities will be required. Key elements of the Operation and Management (O&M) Plan include monitoring and reporting the performance of the solar facility, conducting preventative and corrective maintenance, receiving visitors, and maintaining security.

The potential positive and negative social impacts which could arise as a result of the operation of the proposed project include the following:

6.2.1. Operational Phase Impacts Associated with Naos Solar PV Project Two

6.2.1.1. Direct and Indirect employment opportunities and skills development

It is anticipated that the operation of the project is likely to create a maximum of approximately 50 employment opportunities. Employment opportunities include safety and security staff, operation and monitoring, and maintenance crew. Maintenance activities will be carried out throughout the lifespan of the project, and will include washing of solar panels, vegetation control, and general maintenance around the solar energy facility. The employment opportunities generated as a result of the project will be long term and will last for the duration of operation (i.e., approximately 20 years). None of the employment opportunities will be permanently stationed onsite. In addition to the direct employment opportunities, it is anticipated that additional indirect employment opportunities will be generated during the operation of the project.

Table 6.11: Employment opportunities and skills development

Nature: The creation of employment opportunities and skills development opportunities during the operation phase for the country and local economy.		
	Without Enhancement	**With Enhancement**
Extent	Local-Regional (3)	Local-Regional (3)
Duration	Long term (3)	Long term (3)
Magnitude	Low (1)	Medium (2)
Probability	Probable (3)	Definite (4)
Significance	Positive Low (15)	Positive Medium (36)
Status	Positive	Positive
Reversibility	Barely reversible (3)	Irreversible (4)
Irreplaceable loss of resources?	No loss of resource (1)	No loss of resource (1)
Cumulative Effect	Low (2)	Medium (3)
Can impact be enhanced?	Yes	
Enhancement: - It is recommended that local employment policy is adopted to maximise the opportunities made available to the local community. - The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. - Vocational training programs should be established to promote the development of skills.		
No-Go Alternative:		

- The current status quo is maintained due to no impact; however, the no-go option would signify that the positive impacts regarding employment and economic benefits would be lost.
Cumulative impacts: - Opportunity to reduce unemployment rates.
Residual impacts: - Improved pool of skills and experience in the local area.

6.2.1.2. Development of non-polluting, renewable energy infrastructure

South Africa currently relies predominantly on coal-generated electricity to meet its energy needs. As a result, the country's carbon emissions are considerably higher than those of most developed countries partly because of the energy-intensive sectors which rely heavily on low quality coal, which is the main contributor to GHG emissions. The use of solar technology for power generation is considered a non-consumptive use of a natural resource which produces zero GHG emissions during its operation. The generation of RE utilising solar power will contribute positively to South Africa's electricity market. Given South Africa's reliance on Eskom as a power utility, the benefits associated with a REIPPP Programme are regarded as an important contribution, and the advancement of RE has been identified as a priority for South Africa.

Increasing the contribution of the RE sector to the local economy would contribute to the diversification of the local economy and provide greater economic stability. The growth in the RE sector as a whole could introduce new skills and development into the area. This is especially true with regards to solar power specifically considering the number of other solar power projects proposed within the broader area.

The development of RE projects have the potential to contribute to the stability of the economy and could contribute to the local economy through employment generation (direct, indirect, and local service providers) and revenue generation for the LM. While the overall contribution of the project to South Africa's total energy requirements is small, the facility will also contribute towards offsetting the total carbon emissions associated with energy generation in South Africa. It should however be noted that such a benefit is associated with all RE projects and not only solar power projects.

Table 6.12: Assessment of the development of non-polluting, renewable energy infrastructure

Nature: Development of non-polluting, renewable energy infrastructure.		
	Without Enhancement	**With Enhancement**
Extent	Local-Regional-National (4)	Local-Regional-National (4)
Duration	Long term (4)	Long term (4)
Magnitude	Medium (2)	Medium (2)
Probability	Definite (4)	Definite (4)
Significance	Positive Medium (36)	Positive Medium (36)

Status	Positive	Positive
Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources?	Marginal loss of resource (2), in terms of the impact of climate change on ecosystems.	Marginal loss of resource (2), in terms of the impact of climate change on ecosystems.
Cumulative Effect	Medium (3)	Medium (3)
Can impact be enhanced?	No	
Enhancement: - None identified.		
No-Go Alternative: - The current status quo is maintained due to no impact; however, the no-go option would signify that the positive impacts regarding the generation of renewable energy for South Africa would be lost.		
Cumulative impacts: - Reduce carbon emissions through the use of renewable energy and contribute to reducing global warming.		
Residual impacts: - Reduce carbon emissions through the use of renewable energy and contribute to reducing global warming.		

6.2.1.3. Potential loss of agricultural land

The development of the proposed project on an agricultural property would result in the area of land required to support the development footprint being removed from potential agricultural production. This could have negative implications in terms of food production and security and could also threaten jobs of workers employed in the agricultural activities. The site is however not located in an area with high agricultural capability in terms of crop production.

Table 6.13: Assessment on the loss of agricultural land and overall productivity

Nature: Loss of agricultural land and overall productivity as a result of the operation of the proposed project on an agricultural property.		
	Without Mitigation	**With Mitigation**
Extent	Site (1)	Site (1)
Duration	Long term (3)	Long term (3)
Magnitude	Medium (2)	Medium (2)
Probability	Probable (3)	Possible (2)
Significance	Negative Medium (30)	Negative Low (22)

Status	Negative	Negative
Reversibility	Partly reversible (2)	Reversible (1)
Irreplaceable loss of resources?	High (3)	Medium (2)
Cumulative Effect	Medium (3)	Low (2)
Can impact be mitigated?	Yes	
Mitigation: - The proposed mitigation measures for the construction phase should have been implemented at this stage. - Mitigation measures from the Agricultural and Soil Report, should also be implemented.		
No-Go Alternative: - The current status quo is maintained due to no impact.		
Cumulative impacts: - The cumulative impacts associated with the loss of productive farmland are the effect it has on the livelihoods of the farmers, their families and the workers on the farms and their families. As indicated above this impact can be mitigated through rehabilitation. This also has a cumulative effect on national food security.		
Residual impacts: - The residual impacts for the potential loss of productive farmland are the overall loss of grazing for livestock if the productive farmland is not rehabilitated in the decommissioning phase		

6.2.1.4. Contribution to Local Economic Development (LED) and social upliftment

Projects which form part of the DMRE REIPPP Programme are required, as part of their bidding requirements, to contribute towards LED and social upliftment initiatives within the area in which they are proposed. In addition, they are required to spend a percentage of their revenue on socio-economic and enterprise development, as well as allocate ownership shares to local communities that benefit previously disadvantaged communities around the project. A portion of the dividends generated by each development also need to be invested into LED projects and programmes. The proposed development therefore has the potential to contribute positively towards socio-economic development and improvements within the local area.

Socio-economic spin-offs from the proposed development could therefore contribute towards better infrastructure provision, and the investment in education and skills development. An in-depth Community Needs Assessment (CNA) is required to ensure that the beneficiary community's needs are understood and sufficiently addressed by the proposed development programmes in order to contribute meaningfully towards local economic growth and development. It should be noted however that such a benefit would be associated with all RE projects and not just solar power projects in particular.

Table 6.14: Assessment of the contribution to LED and social upliftment

Nature: Contribution to LED and social upliftment during the operation of the project.		
	Without Enhancement	**With Enhancement**
Extent	Local-Regional-National (4)	Local-Regional-National (4)
Duration	Long term (3)	Long term (3)
Magnitude	High (3)	Very High (4)
Probability	Definite (4)	definite (4)
Significance	Positive Medium (48)	Positive High (72)
Status	Positive	Positive
Reversibility	Partly reversible (2)	Barely reversible (3)
Irreplaceable loss of resources?	No loss of resources (1)	No loss of resources (1)
Cumulative Effect	Low (2)	Medium (3)
Can impact be enhanced?	Yes	
Enhancement: - A CNA must be conducted to ensure that the LED and social upliftment programmes proposed by the project are meaningful. - Ongoing communication and reporting are required to ensure that maximum benefit is obtained from the programmes identified, and to prevent the possibility for such programmes to be misused. - The programmes should be reviewed on an ongoing basis to ensure that they are best suited to the needs of the community at the time (bearing in mind that these are likely to change over time).		
No-Go Alternative: - Loss of contribution to LED and social upliftment during the operation of the project.		
Cumulative impacts: - Significant LED and social upliftment of the local communities as a result of other IPP projects within the area.		
Residual impacts: - Social upliftment of the local communities through the development and operation of the project.		

6.2.1.5. Impact on tourism

In the Free State province tourism is regarded as an important sector contributing to the provinces' economic sector. There are not many tourism attractions located in the area of the solar PV project. The impact however of the proposed Naos Solar PV Project Two on the tourism sector is likely to be low due to the lack of tourism facilities in the area, but in some cases the Naos Solar PV Project Two may attract tourists to the proposed area and its surroundings.

Table 6.15: Assessment of potential impacts related to the impact on tourism.

Nature: The potential impact on tourism due to the establishment of the Naos Solar PV Project Two.		
	Without Mitigation / Enhancement	**With Mitigation / Enhancement**
Extent	Local (2)	Local (2)
Duration	Long term (3)	Long term (3)
Magnitude	Medium (2)	Medium (1)
Probability	Probable (3)	Probable (3)
Significance	Positive/ Negative Low (24)	Positive/ Negative Low (24)
Status	Positive / Negative	Positive / Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No loss of resource (1)	No loss of resource (1)
Cumulative Effect	Low (2)	Low (2)
Can impact be mitigated?	Yes. (No enhancement)	
Mitigation: - Due to the extent of the project no viable mitigation measures can be implemented to eliminate the visual impact of the PV panels, but the subjectivity towards the PV panels can be influenced by creating a "Green Energy" awareness campaign, educating the local community and tourists on the benefits of renewable energy. Tourists visiting the area should be made aware of South Africa's movement towards renewable energy. This might create a positive feeling of a country moving forward in terms of environmental sustainability. This could be implemented by constructing a visitor's centre on the property allocated to the proposed solar farm which should be opened to school fieldtrips, the local community, and tourists		
No-Go Alternative: - The current status quo is maintained due to no impact.		
Cumulative impacts: - The cumulative impacts associated with the impact on the tourism sector are not rated significant. Other PV Plants has been constructed in municipal area and no impact on the tourism sector was identified		
Residual impacts: - There are no residual impacts identified.		

6.2.1.6. Visual and sense of place impacts

An area's sense of place is created through the interaction of various characteristics of the environment, including atmosphere, visual resources, aesthetics, climate, lifestyle, culture, and heritage. An area's sense of place is however subjective and largely dependent on the demographics of the population residing within the area and their perceptions regarding trade-offs. For example, while some individuals may prefer not to see any form of infrastructure development, others may have an interest in large-scale infrastructure, or engineering projects, and the operation of such facilities, and consider the impact to be less significant. Such a scenario may especially be true given that the project comprises a Renewable Energy project and could therefore be seen as benefitting the local environment, when compared to non-renewable energy generation projects.

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 the landscape character and visual impact of Naos Solar PV Project Two. The area surrounding the project site is characterised by farmland and electricity infrastructure. Considering this, it can be anticipated that the visual and sense of place impacts associated with the operation of the facility will be of low significance.

Table 6.16: Assessment of the visual impact and impacts on sense of place

Nature: Visual impacts and sense of place impacts associated with the operation phase of Naos Solar PV Project Two.		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (2)
Duration	Long term (3)	Long term (3)
Magnitude	Medium (2)	Low (1)
Probability	Probable (3)	Possible (2)
Significance	Negative Low (28)	Negative Low (12)
Status	Negative	Negative
Reversibility	Reversible (1) - In case of the no development alternative or in the removal of the PV plant.	Reversible (1) - In case of the no development alternative or in the removal of the PV plant.
Irreplaceable loss of resources?	Significant loss of resources (3)	Marginal loss of resources (2)
Cumulative Effect	Low (2)	Low (2)
Can impact be mitigated?	Yes	
Mitigation: - To effectively mitigate the visual impact and the impact on sense of place during the operational phase of the proposed Naos Solar PV Project Two, it is suggested that the		

recommendations made in the Visual Impact Assessment (specialist study) should be followed in this regard
No-Go Alternative: - The current status quo is maintained due to no impact.
Cumulative impacts: - Potential impact on the current sense of place in the area due to other solar power developments within the area.
Residual impacts: - The visual impact of Naos Solar PV Project Two will remain if the facility is not decommissioned and dismantled after the end of its operational life.

6.2.1.7. Increasement in household earnings.

As seen above, it is anticipated that the operation phase of the projects is likely to create a maximum of approximately 50 work opportunities which involve personnel working in maintenance, security, vegetation control and cleaning for the 20-year lifespan of the project. This will increase the household earnings as well as local expenditure generated through the indirect and induced effects resulting from project expenditure.

Table 6.17: Increase in household earnings

Nature: The creation of employment opportunities and skills development opportunities during the operation phase for the households involved in the project would create an opportunity for an increasement in household earnings.		
	Without Enhancement	**With Enhancement**
Extent	Local-Regional (3)	Local-Regional (3)
Duration	Long term (3)	Long term (3)
Magnitude	Low (1)	Medium (2)
Probability	Probable (4)	Definite (4)
Significance	Low (16)	Medium (32)
Status	Positive	Positive
Reversibility	Barely reversible (1)	Irreversible (2)
Irreplaceable loss of resources?	No loss of resource (1)	No loss of resource (1)
Cumulative Effect	Low (3)	Medium (3)
Can impact be enhanced?	Yes	
Enhancement: - It is recommended that local employment policy is adopted to maximise the opportunities made available to the local community.		

- With the recruitment of the local community for job creation and increasement in household earnings will automatically be seen in the area surrounding the development.
No-Go Alternative: - The current status quo is maintained due to no impact; however, the no-go option would signify that the positive impacts regarding employment and economic benefits would be lost.
Cumulative impacts: - Opportunity to increase in the monthly household earnings of the community involved.
Residual impacts: - Improved economic activities in the area.

6.3. Cumulative Impacts

The EIA Regulations (as amended in 2017) determine that cumulative impacts, "*in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities*." Cumulative impacts can be incremental, interactive, sequential or synergistic. EIAs and BAs have traditionally failed to come to terms with such impacts, largely as a result of the following considerations:

- Cumulative effects may be local, regional or global in scale and dealing with such impacts requires coordinated institutional arrangements;
- Complexity - dependent on numerous fluctuating influencing factors which may be completely independent of the controllable actions of the proponent or communities; and
- Project level investigations are ill-equipped to deal with broader biophysical, social and economic considerations

Naos Solar PV Project Two is proposed within proximity to several other solar energy facilities. According to the DFFE's database twenty solar PV plant applications have been submitted to the Department within the geographic area of investigation (refer to Table 6.17 and Figure 6.1 for an overview of solar PV facilities within a 30km radius of the project site).

Table 6.17: A summary of related projects, that may have a cumulative impact, in a 30 km radius of the study area

Site name	Distance from study area	Proposed generating capacity	DEFF reference	EIA process	Project status
Paleso PV PLANT [1]	11km	150MW	14/12/16/3/3/1/2365	Basic Assessment	Approved
Siyanda PV PLANT	10km	150MW	14/12/16/3/3/1/2369	Basic Assessment	Approved

[1] Environamics was the EAP responsible for the Basic Assessments for the Paleso, Siyanda, Ngwedi, Nyarhi and Thakadu Solar Power Plants.

Thakadu PV PLANT	4km	150MW	14/1216/3/3/1/2476	Basic Assessment	Approved
Ngwedi PV PLANT	9km	150MW	14/12/16/3/3/1/2535	Basic Assessment	In process
Nyarhi PV PLANT	3km	150MW	14/12/16/3/3/1/2533	Basic Assessment	In process
Kabi Vaalkop PV 3	13km	75 MW	12/12/20/2513/3	Scoping and EIA	Approved
Kabi Vaalkop PV 2	12km	75 MW	12/12/20/2513/2	Scoping and EIA	Approved
Kabi Vaalkop PV[2]	11km	75 MW	12/12/20/2513/4	Scoping and EIA	Approved
Kabi Vaalkop PV 1	11km	75 MW	12/12/20/2513/1	Scoping and EIA	Approved
Buffels Solar PV 1	8km	100MW	14/12/16/3/3/2/777	Scoping and EIA	Approved
Buffels Solar PV 2	8km	100 MW	14/12/16/3/3/2/778	Amendment	Approved
Genesis Orkney Solar (Pty) Ltd	24 km	100MW	14/12/16/3/3/2/954	Scoping and EIA	Approved
Mulilo Renewable Project Developments (Pty) Ltd (Cluster Development): Vlakfontein Solar PV1 (Pty) Ltd Biesiefontein Solar PV1 (Pty) Ltd Kleinfontein Solar PV1 (Pty) Ltd Zaaiplaats Solar PV1 (Pty) Ltd	2.78	75 – 100MW	Projects only in commencement phase with no Applications for EA submitted as yet	BAR	In process (commencement Phase)

Hormah Solar PV1 (Pty) Ltd Ratpan Solar PV1 (Pty) Ltd Ratpan Solar PV2 (Pty) Ltd					

***It is unclear whether other projects not related to renewable energy is or has been constructed in this area. In general, development activity in the area is focused on agriculture and mining. It is quite possible that future solar farm development may take place within the general area.*

The potential for cumulative impacts to occur as a result of the projects is therefore likely. Potential cumulative impacts identified for the project include positive impacts on the economy, business development, and employment, as well as negative impacts such as an influx of jobseekers and change in the area's sense of place.

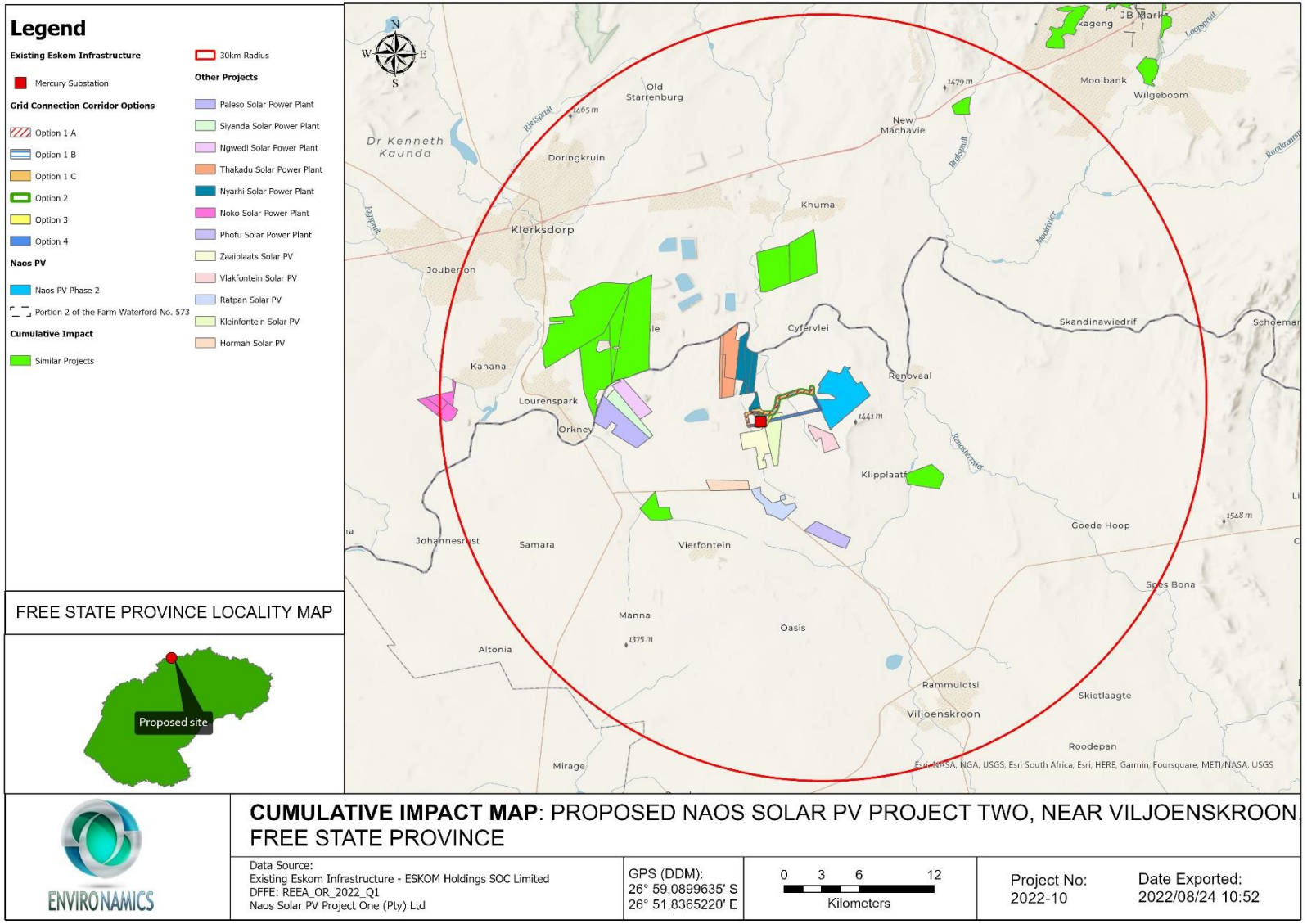


Figure 6.1: Cumulative map showing the location of other solar energy facilities within 30km of the project site.

6.3.1. Cumulative Impacts Associated with Naos Solar PV Project Two

6.3.1.1. Cumulative impact from employment, skills and business opportunities

Naos Solar PV Project Two and the establishment of other solar power projects within the area has the potential to result in significant positive cumulative impacts, specifically with regards to the creation of a number of socio-economic opportunities for the region, which in turn, can result in positive social benefits. The positive cumulative impacts include creation of employment, skills development and training opportunities, and downstream business opportunities. The cumulative benefits to the local, regional, and national economy through employment and procurement of services are more considerable than that of Naos Solar PV Project Two alone.

Table 6.18: Cumulative impacts of employment opportunities, business opportunities and skills development

Nature: An increase in employment opportunities, skills development and business opportunities with the establishment of more than one solar power facility.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local-Regional (3)	Local-Regional (3)
Duration	Long term (3)	Long term (3)
Magnitude	High (3)	High (3)
Probability	Probable (3)	Definite (4)
Significance	Positive Medium (39)	Positive Medium (42)
Status	Positive	Positive
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No loss of resources (1)	No loss of resources (1)
Cumulative Effect	Low (2)	Low (2)
Can impact be enhanced?	Yes	
Enhancement: - The establishment of several solar power projects under the REIPPP Programme in the area has the potential to have a positive cumulative impact on the area in the form of employment opportunities, skills development and business opportunities. The positive benefits will be enhanced if local employment policies are adopted, and local services providers are utilised by the developers to maximise the project opportunities available to the local community.		
Residual impacts: - Improved pool of skills and experience in the local area. - Economic growth for small-scale entrepreneurs.		

6.3.1.2. Cumulative impact with large scale in-migration of people

While the development of a single solar power project may not result in a major influx of people into an area, the development of several projects may have a cumulative impact on the in-migration and movement of people. In addition, the fact that the project is proposed within an area characterised by good levels of solar irradiation suitable for the development of commercial solar energy facilities implies that the surrounding area is likely to be subject to considerable future applications for PV energy facilities. Levels of unemployment, and the low level of earning potential may attract individuals to the area in search of better employment opportunities and higher standards of living.

It is exceedingly difficult to control an influx of people into an area, especially in a country where unemployment rates are high. It is therefore important that the project proponent implement and maintain strict adherence with a local employment policy in order to reduce the potential of such an impact occurring.

Table 6.19: Cumulative impact with large-scale in-migration of people

Nature: Negative impacts and change to the local economy with an in-migration of labourers, businesses and jobseekers to the area.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (2)	Local-Regional (3)
Duration	Short term (1)	Long term (3)
Magnitude	Low (1)	High (3)
Probability	Unlikely (1)	Probable (3)
Significance	Negative Low (8)	Negative Medium (42)
Status	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No loss of resources (1)	No loss of resources (1)
Cumulative Effect	Low (2)	Medium (3)
Can impact be mitigated?	Yes	
Mitigation: - Develop a recruitment policy / process (to be implemented by contractors), which will source labour locally. - Work together with government agencies to ensure service provision is in line with the development needs of the local area. - Form joint ventures with community organisations, through Trusts, which can provide local communities with benefits, such as employment opportunities and services.		
Residual impacts:		

- Possibility of outside workers remaining in the area after construction is completed and subsequent pressures on local infrastructure, services and poverty problems.

6.4. Decommissioning Phase

Typically, major social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income and will be similar to the impacts during the construction phase. 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 Naos Solar PV Project Two it is anticipated that the proposed facility will be refurbished and upgraded to prolong its life. No decommissioning of the facility is proposed.

6.5. Assessment of Alternatives

No alternative sites have been identified for assessment. The final location of the proposed project on the proposed site will be informed by technical considerations and inputs from the relevant specialist studies (including the SIA) being undertaken as part of the BA process. The location of collector substations will have a negligible difference on the social impacts.

6.6. Assessment of Impacts for the No-Go Alternative

The “no-go” alternative is the option of not constructing Naos Solar PV Project Two. The implementation of Naos Solar PV Project Two is expected to result in a number of positive and negative social impacts. The majority of negative impacts identified for the project are associated with the construction phase of the project, while the positive impacts are associated with both the construction and operation phase of the project.

Potential negative social impacts associated with the construction and operation of the project include the following:

- Potential influx of job seekers and an associated change in population and increase in pressure on basic services.
- Potential safety and security impacts.
- Potential impacts on daily living and movement patterns.
- Potential nuisance impacts (noise and dust).
- Potential visual and sense of place impacts.

Potential positive social impacts associated with the construction and operation of the project include the following:

- Potential direct and indirect employment opportunities.
- Potential economic multiplier effect.
- Development of non-polluting, renewable energy infrastructure.

The impacts of pursuing the “no-go” alternative can therefore be summarised as follows:

- The benefits would be that there is no disruption from nuisance impacts (noise and dust during construction), visual impacts and safety and security impacts. The impact is therefore neutral.

- There would also be an opportunity loss in terms of job creation, skills development, and associated economic business opportunities for the local economy.

The option of not developing Naos Solar PV Project Two would not compromise the development of RE facilities in South Africa. However, the socio-economic benefits for local communities associated with this specific project would be forfeited.

The use of renewable energy will increase. By reducing the use of coal, carbon emissions will reduce and effectively benefit climate change and global warming.

7. KEY FINDINGS AND RECOMMENDATIONS

This SIA focused on the collection of data to identify and assess social issues and potential social impacts associated with the development of Naos Solar PV Project Two. Secondary data was collected and presented in a literature review and primary data was collected through consultations with affected and adjacent landowners and key stakeholders. The environmental assessment framework for assessment of impacts and the relevant criteria were applied to evaluate the significance of the potential impacts. A summary of the potential positive and negative impacts identified for the detailed design and construction, and operation phase are presented in Table 7.1 and Table 7.2. A summary of the potential positive and negative cumulative social impacts identified for the project is provided in Table 7.3.

Table 7.1: Summary of potential social impacts identified for the detailed design and construction phase.

Impact	Significance Without Mitigation / Enhancement	Significance With Mitigation / Enhancement
Positive Impact		
Creation of direct and indirect employment and skills development opportunities.	Positive Low (22)	Positive Medium (36)
Economic multiplier effects	Positive Low (22)	Positive Medium (39)
Improvements to shared infrastructure	Positive (11)	Positive (26)
Negative Impacts		
Potential loss of productive farmland	Negative Medium (39)	Negative Low (20)
In-migration of people (non-local workforce and jobseekers).	Negative Medium (38)	Negative Low (17)
Safety and security impacts	Negative Medium (36)	Negative Low (18)
Impacts on daily living and movement patterns	Negative Medium (36)	Negative Low (20)
Nuisance impact (noise and dust)	Negative Medium (33)	Negative Low (20)
Potential impacts of increased risk of potential veld fires	Negative Medium (36)	Negative Low (18)
Visual and sense of place impacts	Negative Low (12)	Negative Low (9)

Table 7.2: Summary of potential social impacts identified for the operation phase.

Impact	Significance Without Mitigation / Enhancement	Significance With Mitigation / Enhancement
Positive Impact		
Direct and indirect employment and skills development opportunities	Positive Low (15)	Positive Medium (36)
Development of non-polluting, renewable energy infrastructure	Positive Medium (36)	Positive Medium (36)
Contribution to LED and social upliftment	Positive Medium (48)	Positive High (72)
Potential impacts on tourism	Positive Low (24)	Positive Low (24)
Increased household earnings	Positive Low (16)	Positive Medium (32)
Negative Impacts		
Potential impacts on tourism	Negative Low (24)	Negative Low (24)
Impacts associated with the loss of agricultural land.	Negative Medium (30)	Negative Low (22)
Visual and sense of place impacts	Negative Low (28)	Negative Low (12)

Table 7.3: Summary of potential cumulative social impacts identified for the project.

Cumulative Impact	Significance Without Mitigation / Enhancement	Significance With Mitigation / Enhancement
Positive Cumulative Impact		
Cumulative impact from employment, skills and business opportunities and skills development	Positive Medium (39)	Positive Medium (42)
Negative Cumulative Impacts		
Cumulative impact with large-scale in-migration of people	Negative Low (8)	Negative Medium (42)

7.1. Key Findings

There are some vulnerable communities within the project area that may be affected by the development of Naos Solar PV Project Two and its associated infrastructure. These communities may include the communities of Viljoenskroon and Orkney as well as their surroundings. Traditionally, the construction phase of a PV solar development is associated with most social impacts. Many of the

social impacts are unavoidable and will take place to some extent but can be managed through the careful planning and implementation of appropriate mitigation measures. Several potential positive and negative social impacts have been identified for the project, however an assessment of the potential social impacts indicated that there are no perceived negative impacts that are sufficiently significant to allow them to be classified as “fatal flaws”.

Based on the social impact 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 solar PV projects (these relate to an influx of non-local workforce and jobseekers, intrusion and disturbance impacts (i.e., noise and dust, wear and tear on roads) and safety and security risks), and could be reduced with the implementation of the mitigation measures proposed. The significance of such impacts on the local communities can therefore be mitigated.
- The development will introduce employment opportunities during the construction phase (temporary employment) and a limited number of permanent employment opportunities during operation phase.
- The proposed project could assist the local economy in creating entrepreneurial growth and opportunities, especially if local business is involved in the provision of general material, goods and services during the construction and operational phases. This positive impact is likely to be compounded by the cumulative impact associated with the development of several other solar facilities within the surrounding area, and because of the project’s location within an area which is characterised by high levels of solar irradiation, and which is therefore well suited to the development of commercial solar energy facilities.
- The proposed development also represents an investment in infrastructure for the generation of non-polluting, Renewable Energy, which, when compared to energy generated because of burning polluting fossil fuels, represents a positive social benefit for society.
- When considering Naos Solar PV Project Two, it is also important to consider the cumulative social impacts that may arise with other proposed solar PV projects in the area.
- It should be noted that the perceived benefits associated with the project, which include RE generation and local economic and social development, outweigh the perceived impacts associated with the project.

7.2. Recommendations

The following recommendations are made based on the SIA. The proposed mitigation measures should be implemented to limit the negative impacts and enhance the positive impacts associated with the project. Based on the social assessment, the following recommendations are made:

- The appointment of a CLO to assist with the management of social impacts and to deal with community issues, if feasible.
- It is imperative that local labour be sourced, wherever possible, to ensure that benefits accrue to the local communities. Efforts should be made to involve local businesses during the construction activities, where possible. Local procurement of labour and services / products would greatly benefit the community during the construction and operational phases of the project.

- Local procurement of services and equipment is required where possible in order to enhance the multiplier effect.
- Involve the community in the process as far as possible (encourage co-operative decision making and partnerships with local entrepreneurs).
- Employ mitigation measures to minimise the dust and noise pollution and damage to existing roads.
- Safety and security risks should be considered during the planning / construction phase of the proposed project. Access control, security and management should be implemented to limit the risk of crime increasing in the area.

7.3. Conclusion

The proposed project and associated infrastructure are unlikely to result in permanent damaging social impacts. From a social perspective it is concluded that the project could be developed subject to the implementation of recommended mitigation measures and management actions identified for the project.

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