

**SOCIO-ECONOMIC IMPACT
ASSESSMENT FOR THE UMMBILA
SOLAR PV (150MW) FACILITY ON A
SITE NEAR BETHAL AND
MORGENZON, MPUMALANGA
PROVINCE**

**Socio-Economic Impact Assessment
EIA Report - (150MW Solar PV)
September 2022**

Prepared for:



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Abbreviations

UEREf	Umbila Emoyeni Renewable Energy Facility
BESS	Battery Energy Storage System
NERSA	National Energy Regulator South Africa
JET	Just Energy Transition
IISD	International Institute for Sustainable Development
TIPS	Trade & Industry Policy Strategies
MW	Mega Watt
IRP	Integrated Resource Plan
WGBl	World Government Bond Index
GDP	Gross Domestic Product
SACCI	South African Chamber of Commerce and Industry
BCI	Business Confidence Index
FDI	Foreign Direct Investment
GVA	Gross Value Added
CAGR	Compound Average Growth Rate
AOI	Area of Impact
EMPr	Environmental Management Programme

Specialist Details

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Company Profile:	<p>URBAN-ECON Development Economists (Pty) Ltd is a professional consultancy firm specialising in the field of development economics. Development economics, as advocated by URBAN-ECON, refers to the field of research where spatial principles are applied in an economic context. URBAN-ECON combines specialised skills, extensive experience, professional ethics and personal service delivery to provide appropriate and practical economically viable solutions. A personal approach in efficient service delivery ensures that project deliverables align with the clients' needs, therefore equipping the client with the necessary knowledge to make informed decisions.</p>
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1 INTRODUCTION

1.1 Project Description

Urban-Econ Development Economist Pty (Ltd) has been appointed by Savannah Environmental (Pty) Ltd on behalf of the client Emoyeni Renewable Energy Farm (Pty) Ltd, to provide specialist socio-economic impact assessment inputs of the proposed 150MW Solar PV Facility near Bethal and Morgenzon. Emoyeni Renewable Energy Farm (Pty) Ltd is proposing a development for a renewable energy facility, collectively known as the Umbila Emoyeni Renewable Energy Facility (UERE), consisting of the following segments:

- » Commercial Wind Farm
- » Solar PV Facility
- » Associated grid infrastructure, including a battery energy storage system

Emoyeni Renewable Energy Farm (Pty) Ltd is proposing the development of a commercial Solar Energy Facility and associated infrastructure on a site located ~6km south-east of Bethal and 1km east of Morgenzon, within the Mpumalanga Province. The project site is located across the Govan Mbeki, Lekwa, and Msukaligwa Local Municipalities within the Gert Sibande District on the following properties (refer to Table 1-1).

Table 1-1: Project Site Farm Portions

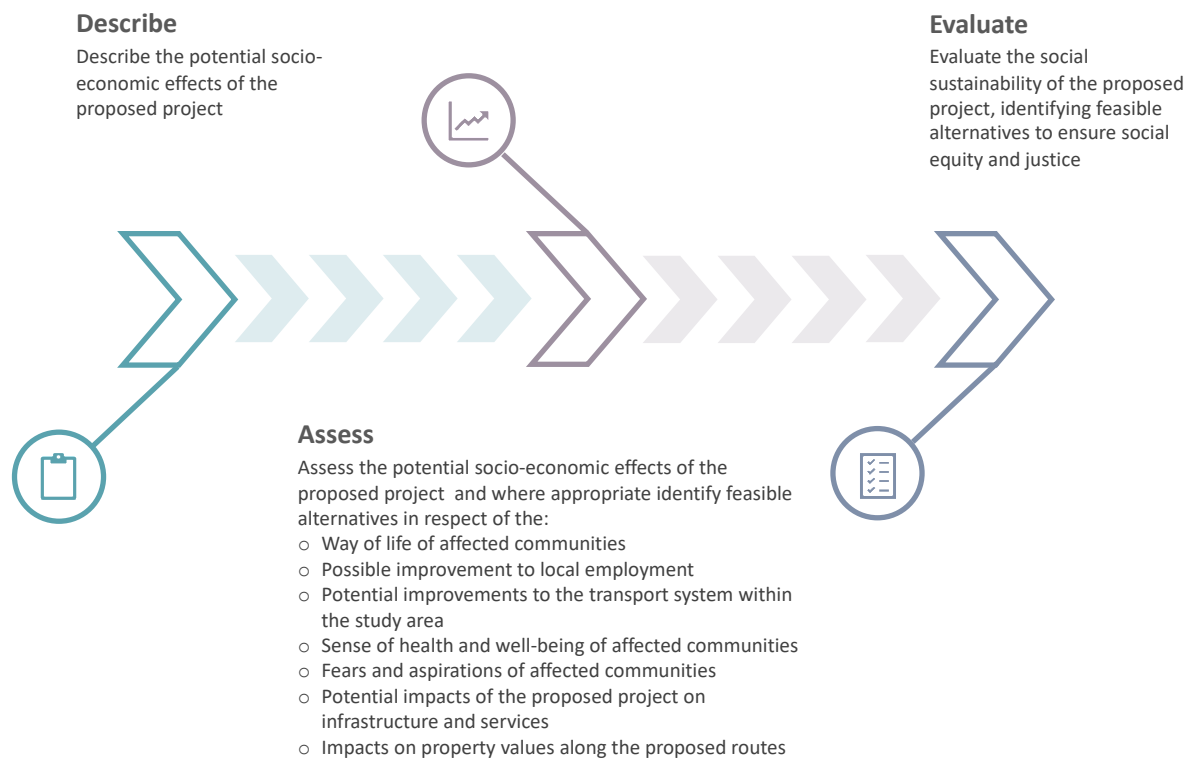
Parent Farm Number	Farm Portions
Farm 264 – Geluksplaats	0, 11
Farm 420 – Rietfontein	8, 9, 10, 32
Farm 423 – Bekkerust	0 R/E, 1, 5 R/E, 22

1.2 Overall Project Objective

The objective of this project is to undertake a Socio-Economic Impact Assessment (SEIA) for the Scoping and EIA phases for the UERE. This report deals with the scoping phase of the 150MW Solar PV Facility.

Social-Economic Impact Assessment (SEIA) aims to assess any potential socio-economic impacts, either positive or negative, that may arise as a result of a proposed development. The socio-economic impacts will be analysed for the construction and operation phases of the proposed development. Additionally, mitigation measures to reduce the severity of negative impacts and measures to optimise the positive impacts will be included in the report.

Figure 1-1: Project Objective



1.3 Scope of Work

The scope of work for this assessment quote is in line with the NEMA protocols released in March 2020.

The Socio-Economic Impact Assessment will:

- » Identify and assessment the socio-economic impacts associated with:
 - the construction phase,
 - the operational phase
 - if relevant, the decommissioning, abandonment or rehabilitation phase of the proposed project
- » Provide a general overview of the baseline conditions associated with the affected community
- » Identify and assess any potential socio-economic impacts, either positive or negative, that may arise because of the proposed project of individuals, household, agricultural related activities including forestry and commercial businesses
- » To identify and assess the economic impacts of the proposed project during construction and its operation of the economic activities (gross value added, income generation and employment due to the implementation of the project
- » Identify mitigation measures to reduce the severity of negative impacts and measures to optimise the positive impacts are to be included in the report

1.4 Delineation of Study Area

Study area delineation depends on the type of economic activity that is analysed and the perceived spread of economic impacts that are expected to be generated from the project during both the construction and operation phases. The municipal area where the site is located is likely to experience some direct, indirect and induced impacts resulting from the activities on the site; however, it is unlikely that a local economy can be sufficiently diversified to supply all materials and services and support construction and operational activities from start to finish. Economic impacts therefore tend to extend far beyond municipal boundaries and spread throughout the entire national economy.

1.4.1 Primary, secondary, and tertiary study area

As indicated earlier, the footprint of the proposed UEREF will stretch across various farm portions as indicated in **Error! Reference source not found.**. The potential zone of influence of the proposed project, will not be limited to these farm portions but, will extend beyond the boundaries of the project site due to the potential socio-economic impacts. As such, the following zones of influences are delineated for the purpose of the analysis:

- Primary zone of influence: For the purpose of the analysis of the impact on property values and the agricultural industry, as well as the assessment of potential local economic impacts that could ensue from the project, the primary zone of influence is determined to be the local municipality.
- Secondary and tertiary zones of influence: Economic benefits and impacts will not be limited to the site or the nearby towns and settlements only.

Most of the goods and services that will be purchased for the construction and will be required for operation of the project will be secured from outside the primary zone of influence and specifically from areas such as Middelburg and Johannesburg. Therefore, the Mpumalanga Province and the rest of South Africa are defined as the secondary and tertiary zones of influence of the proposed project from an economic perspective.

1.5 Methodology

The following sections outline the research methods that have been employed in the study.

1.5.1 Project description and study area delineation

This step involves the description of the proposed projects and delineation of the core study areas for basic social impact assessment.

1.5.2 Data collection

This step will involve collection of both primary and secondary data. The former will involve virtual and/or telephonic interviews with the local government authorities, local community representatives, and affected landowners. The latter will encompass the collection and review of relevant policies, local and provincial strategic documents, and statistics presented by Stats SA and Quantec.

1.5.3 Baseline profiling

This step will focus on a description of the study areas' socio-economic environment based on the data collected in the previous step. The baseline profile will be used to interpret the impacts and measure the extent of socio- economic impacts that could ensue from the establishment of the proposed development.

1.5.4 Identification and description of the anticipated impacts

This step will include the description of the potential socio-economic impacts that could be expected to ensue considering the development's components.

1.5.5 Quantification of OPEX and CAPEX

Economic impact modelling will be undertaken for both the construction and operational phase of the project in order to quantify all upstream and downstream impacts to the local and national economy through the application of economic multipliers developed for the Eastern Cape Province. This will allow for impacts to be forecasted through the various sectors of the economy and provide for the magnitude of the development from a Regional Gross Domestic Product (GDP_R), Production, Job creation and tax perspective. In addition, the economic impacts of the proposed SED infrastructure spend will also be modelled.

1.5.6 Interpretation and evaluation

Once the impacts are identified, they will be interpreted in the context of the affected environments, i.e., baseline profiles, and evaluated. The impacts and extent thereof will be assessed and categorised in line with the rating provided by the environmental specialist.

1.6 Source of Information

The following information will be sourced from various sources to inform the study:

» From the client:

- Start of construction and operations
- Cost of development and operating expenses
- Construction methodology
- Number of people to be employed during construction and operations
- Contact details of I&APs as well as surrounding landowners

- Percentage of jobs to be allocated to the local communities
- Types of skills required and to be filled by people from the local communities
- Small business development programme during both construction and operational phase
- » From the site visit/interviews:
 - Socio-economic challenges experienced by the affected stakeholders
 - Need and desirability of the proposed developments
 - Concerns and issues related to the developments
 - Affected stakeholders' expectations
 - Alignment with the local government vision and objectives
 - Other projects planned for the area
- » From secondary sources:
 - Previously completed studies and reports
 - Stats SA Census 2011 and Community Survey 2016
 - StatsSA Labour Force Survey
 - Quantec Research database
 - Integrated Development Plans (IDP)
 - Spatial Development Frameworks
 - Local Municipal and Provincial strategic documents where applicable.

1.7 Assumptions, limitations and gaps in knowledge

- » The secondary data sources used to compile the socio-economic baseline (demographics, dynamics of the economy) although not exhaustive, can be viewed as being indicative of broad trends within the study area.
- » The study was done with the information available to the specialist within the time frames and budget specified.
- » Possible impacts and stakeholder responses to these impacts cannot be predicted with complete accuracy, even when circumstances are similar, and these predictions are based on research and years of experience, taking the specific set of circumstances into account.
- » It is assumed that the motivation, and ensuing planning and feasibility studies for the project were done with integrity and that all information provided to the specialist by the project proponent and its consultants to date is accurate.
- » The estimated year when construction will start is still to be confirmed, as various submissions are still to be completed.
- » The majority of landowners responded to the survey that was distributed, but there were still several landowners that did not respond. A detailed response sheet is listed in Annexure B.

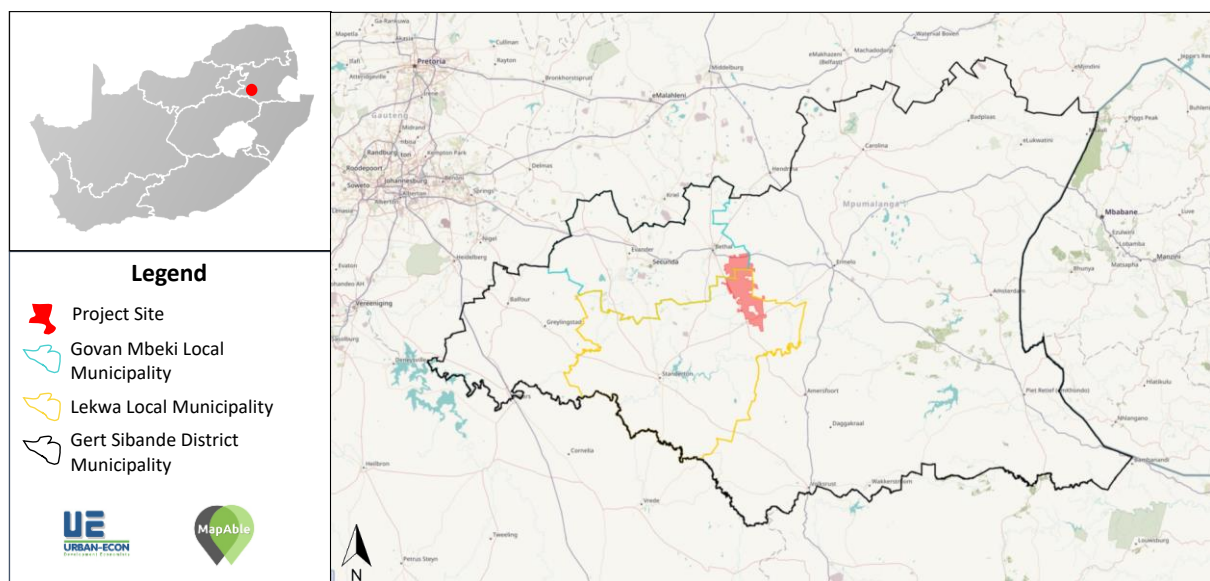
2 DESCRIPTION OF THE PROPOSED PROJECT

In this section a description of the proposed 150MW Solar PV Facility is provided. The site where the proposed project will be located and the activities that will take place on and off the site will be discussed.

2.1 Site Location

The project is located in the Govan Mbeki, Lekwa and Msukaligwa Local Municipalities and within the Gert Sibande District Municipality in Mpumalanga. Map 2-1 below indicates the locations of the proposed UEREF on a macro-level.

Map 2-1: Umbila Emoyeni Renewable Energy Farm Location



Source: MapAble, 2022

2.2 Project Details

The facility will have a contracted capacity of up to 150MW and will be known as the Umbila Emoyeni Solar Energy Facility. The project is planned as part of a larger cluster of renewable energy projects (to be known as the Umbila Emoyeni Renewable Energy Farm), which include one 666MW Wind Energy Facility and one 150MW Solar Energy Facility. The grid connection infrastructure for both facilities will include a 400/132kV Main Transmission Substation (MTS), to be located between Camden and SOL Substations, which will be looped in and out of the existing Camden-Sol 400kV transmission line; on-site switching stations (132kV in capacity) at each renewable energy facility (Eskom Portion); and 132kV power lines from the switching stations at each renewable energy facility to the new 400/132Kv MTS.

Infrastructure associated with the Umbhila Emoyeni Solar Energy Facility will include:

- PV modules in the range of 330Wp to 450Wp mounted on either a fixed tilt or single axis tracker structure, dependent on optimisation, technology available and cost.
- Inverters and transformers.
- 33kV cabling to connect to the onsite collector substation, to be laid underground where practical.
- 33kV/132kV onsite collector substation (IPP Portion).
- Battery Energy Storage System (BESS).
- Cabling between project components.
- Laydown and O&M hub (approximately 300m x 300m):
- Construction compound (temporary).
- Maintenance office.
- Access roads (up to 12m wide) and internal distribution roads (up to 12m wide).

A summary of the details and dimensions of the planned infrastructure associated with the project is provided in Table 2-1.

Table 2-1: Details or dimensions of typical infrastructure required for the 150MW Umbhila Emoyeni Solar Energy Facility

Infrastructure	Footprint and dimensions
Number of Panels	522 727 panels
Panel Height	Up to 5m
Technology	Use of fixed-tilt, single-axis tracking, and/or double-axis tracking PV technology. Monofacial or bifacial panels are both considered.
Contracted Capacity	Up to 150MW
Area occupied by the solar array	255.2ha
Area occupied by the on-site facility substation (IPP Portion)	~5ha
Capacity of on-site facility substation (IPP Portion)	33kV/132kV
Underground cabling between the PV array and the onsite substation	Cabling will be installed underground where feasible at a depth of up to 1.5m to connect the PV panels to the on-site facility substation. Where not technically feasible to place cabling underground, this will be installed above-ground. The cabling will have a capacity of up to 33kV.
Laydown and Operations and Maintenance (O&M) hub	~ 300m x 300m, comprising: <ul style="list-style-type: none"> * Construction compound (temporary) of approximately 6 ha. * O&M office of approximately 1.5ha.
Area occupied by laydown area	~75m x 120m
Access and internal roads	Wherever possible, existing access roads will be utilised to access the project site and development area. It is unlikely that access roads will need to be upgraded as part of the proposed development. Internal roads of up to 12-13m in width will be required to access the PV panels and the on-site substation.
Grid connection	The grid connection infrastructure will include a 400/132kV Main Transmission Substation (MTS), to be located between Camden and SOL Substations, which will

Infrastructure	Footprint and dimensions
	be looped in and out of the existing Camden-Sol 400kV transmission line; on-site switching stations (132kV in capacity) at each renewable energy facility (Eskom Portion); 132kV power lines from the switching stations at each renewable energy facility to the new 400/132kV MTS; and a collector substation with 2 x 132kV bus bars and 4 x 132kV IPP feeder bays to onsite IPP Substation The grid connection infrastructure will be assessed as part of a separate Environmental Impact Assessment process in support of an application for Environmental Authorisation.
Temporary infrastructure	Temporary infrastructure, including laydown areas, hardstand areas and a concrete batching plant, will be required during the construction phase. All areas affected by temporary infrastructure will be rehabilitated following the completion of the construction phase, where it is not required for the operation phase.

The Umbila Emoyeni Solar Energy Facility is proposed in response to the identified objectives of national and provincial government and local and district municipalities to develop renewable energy facilities for power generation purposes. It is the developer’s intention to bid the Umbila Emoyeni Solar Energy Facility under the Department of Mineral Resources and Energy’s (DMRE’s) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or a similar programme, with the aim of evacuating the generated power into the national grid. This will aid in the diversification and stabilisation of the country’s electricity supply, in line with the objectives of the Integrated Resource Plan (IRP), with the Umbila Emoyeni Solar Energy Facility set to inject up to 150MW of electricity into the national grid.

Similarly, the location of the new generation in the Mpumalanga Province is important in the context of the Just Energy Transition (JET). The Umbila Emoyeni Solar Energy Facility will provide valuable jobs and socio-economic benefits that are required in an area where coal fired generation will be phased out over the next 10 years (see graph below). This will be vitally important if the JET is to be successfully implemented and is a transition for everyone.

2.3 Description of Planned Construction Activities and Methodology

Construction of the Umbila Emoyeni Solar PV Farm will be approached in multiple stages. This means that multiple construction activities will be simultaneously taking place at various times, and certain elements of infrastructure will be shared by each distinct “phase” of the overall project.

As many materials as practical will be purchased and manufactured locally. This includes the majority of steel products, transformers and certain cables, pipes, valves, windings and bushings. Once Notice to Proceed is issued to the construction firm, the site will be prepared for construction and initial activities will take place (approx. 3 months).

This entails establishment of the site by Engineering Procurement and Construction (EPC) contractors and site managers. Final geotechnical studies and roads will be undertaken, and the basic design of Balance of Plant (electrical and civil) will take place. Long-lead items such as transformers will be ordered from local suppliers. Solar panels and inverters will be ordered from international suppliers. Detailed design of electrical and civil balance of plant will be completed. Solar panels and inverters will be manufactured overseas and shipped to South Africa (approx. 7 months for inverters and six months for panels to arrive after order). These will be offloaded at the Richards Bay deep-water port and transported along the N2 highway, via Ermelo, to the site. There is however scope for locally produced panels to be procured should there be sufficient supply to meet our demand.

There does exist local panel manufacturing capacity, but supply cannot always meet the demand of the REIPPPP Bid Windows and private solar projects. Wherever possible, local panels and inverters will be paid. Construction of roads will begin as soon as the necessary geotechnical studies are concluded. Trenches will be dug for underground cabling along service and access roads – 33kV underground cables will be positioned in these trenches then covered from the Plant to the collector substation. Once all panels are installed and a grid connection test is completed (1 week), Commercial Operation will begin. Economies of scale may allow for construction timelines to be reduced as contractors find a rhythm with certain tasks and may be able to avoid the initial phase of getting comfortable with a job by simply moving on to do the same task on a subsequent phase.

Operation of the facility will involve routine cleaning and maintenance of panels on a schedule and as needed. Further monitoring and reporting of the facility will require a full-time team. A security team will also patrol the site.

3 NEEDS AND DESIRABILITY

South Africa is currently experiencing electricity supply challenges, which in turn is leading to periodic load shedding. The impact of load shedding has had massive effects on the economy and society at large. Furthermore, impacts of COVID-19, reduced business confidence and national sub-investment downgrades have all had impacts on the economy of the country. This section outlines the need and desirability of the proposed UEREF based on the above-mentioned aspects.

3.1.1 South African electricity supply

South Africa's energy mix is largely focused on the use of non-renewable fossil fuels. The Department of Energy (DoE) notes that 83% of electricity production in South Africa is supplied by coal followed distantly by 6% pumped storage, 5% gas, 4% nuclear, 2% hydroelectric and 0,2% wind (National Department of Energy (DOE), 2019). It is noted by the DoE that renewables are the future of energy generation in South Africa especially as the costs of generating electricity through traditional means increases (National Department of Energy (DOE), 2019).

South Africa is also considered to be the world's 14th largest emitter of greenhouse gases (McSweeney & Timperley, 2018). The CO₂ emissions are principally due to a heavy reliance on coal to produce energy. South Africa has also pledged (through the Paris Accord) to reduce emissions and cap the amount of greenhouse gasses that would be emitted. This commitment was aligned to the national planning policy which promoted the utilisation of renewable resources to generate energy (McSweeney & Timperley, 2018).

Despite the impacts of the COVID-19 pandemic, renewable energy set a record in new power capacity in 2020 and was the only source of electricity generation to register a net increase in total capacity. As in past years, the highest share of renewable energy use was in the electricity sector (26% renewables); however, electrical end-uses accounted for only 17% of total final energy consumption. The transport sector, meanwhile, accounted for an estimated 32% of TFEC and had the lowest share of renewables (3.3%). The remaining thermal energy uses, which include space and water heating, space cooling, and industrial process heat, represented more than half (51%) of TFEC; of this, renewables supplied some 11% (REN21, The Renewables 2021 Global Status Report, 2021).

Installed renewable power capacity grew by more than 256 gigawatts (GW) during the pandemic, the largest ever increase. Continuing a trend dating back to 2012, net additions of renewable power generation capacity outpaced net installations of both fossil fuel and nuclear power capacity combined.

China again led the world in renewable capacity added, accounting for nearly half of all installations in 2020 and leading the global markets for concentrating solar thermal power (CSP), hydropower, solar PV and wind power. China added nearly 117 GW, bringing online more renewable capacity in 2020 than the entire world did in 2013 and almost doubling its additions from 2019. By the end of 2020, at least 19 countries had more than 10 GW of non-hydropower renewable capacity, up from 5 countries in 2010. Renewable energy reached a record share – an estimated 29% – of the global electricity mix. Despite these advances, renewable electricity continued to face challenges in achieving a larger share of global electricity generation, due in part to persistent investment in fossil fuel (and nuclear) power capacity (REN21, The Renewables 2019 Global Status Report, 2019).

South Africa is regarded as a prime candidate for increased use of renewable energy with abundant natural resources of sun and wind. The further development of renewable energy will align to the current shift in international trends and align well with the available resources of the country. The cost of renewables, notably solar and wind, has fallen significantly in South Africa. Solar PV and wind costs have fallen 80% and 60%, respectively, in just four years (McSweeney & Timperley, 2018). New renewable capacity is now “considerably cheaper” than coal plants proposed or under construction (McSweeney & Timperley, 2018).

Additionally, the supply of electricity in South Africa is currently exceptionally constrained. Load shedding in South Africa began in 2007 as a result of insufficient electricity generating capacity by the government-owned national power utility, Eskom. The advent of load shedding has brought numerous direct economic impacts, indirect economic impacts and social impacts to South Africa. These are outlined in the table below:

Table 3-1: The consequences of power interruptions

Direct Economic Impacts	Indirect Economic Impacts	Social Impacts
Loss of business and manufacturing production	Cost of postponed income	Loss of leisure time
Restart costs	Loss of market share	Risks to health and safety
Equipment damage	Limitations to expansion and growth of production	
Raw material spoilage	Loss of competitive advantages	
Cost of backup systems	Loss of investor confidence	

Source: (Goldberg, 2015)

These costs are associated with losses to productivity and limitation of growth for companies and as a result limit the growth of the country (Goldberg, 2015). Load shedding thus threatens jobs, economic recovery, and the livelihood of many South Africans around the country. Local research done through government agencies has also noted the need for change in the electricity industry.

The National Energy Regulator of South Africa (NERSA), (National Electricity Industry Regulation: A different focus on the electricity supply industry challenges and possible solutions, 2020) has examined the electricity supply industry challenges and possible solutions for those challenges and has maintained that continued price increases for electricity is unsustainable as it reduces demand. The increase in electricity prices has led to an increase in export of un-beneficiated ore which is likely to increase as the electricity price increases (NERSA, 2020).

It has also been noted that there has been a reduction in export volumes of minerals which is likely a result of the increased price of electricity and unstable electricity supply. It has also been noted that the negative trend in exports mimic the Gross Domestic Product (GDP) growth trends, which seems to be inversely proportional to electricity prices (NERSA, 2020). NERSA has also noted that electricity price is a significant cost driver for some sectors. The increase in electricity cost has a greater impact on some sectors such as the metals, steel and mining industry and less of an impact on other industries such as the transport industry.

New energy trends have also been noted by NERSA (NERSA, 2020). Their position is that the obligation to supply the majority of domestic, commercial, and small industries energy (day load) should be removed from Eskom and be supplied by renewable energy IPP sources (NERSA, 2020).

It can thus be deduced that at a national level any additional energy production which is sustainable, and renewable would improve energy security, further South Africa's goals towards international agreements, provide employment and assist in improving investor confidence in the country.

3.1.2 Just Energy Transition (JET)

According to International Institute for Sustainable Development (IISD), (Strategies for just energy transitions, 2018), energy transitions are shifts in the way people produce and consume energy using different technologies and sources. A low-carbon energy transition is a type of energy transition involving a shift from high-carbon energy sources such as oil, gas and coal to low-carbon and zero-carbon energy sources such as renewables.

A just energy transition is a negotiated vision and process centred on dialogue, supported by a set of guiding principles, to shift practices in energy production and consumption. It aims to minimize negative impacts on workers and communities with stakes in high-carbon sectors that will wind down, and to maximize positive opportunities for new decent jobs in the low-carbon growth sectors of the future. It strives to ensure that the costs and benefits of the transition are equitably shared.

Acting sooner rather than later can make energy transitions less expensive and more equitable, while also providing new opportunities for countries to build low-carbon industries. Nonetheless, overcoming "carbon lock-in" is difficult, and targeted political and media efforts are required to speed up just energy transitions. Much may be done to help these processes, which are either underway or in the early stages in many nations. Based on case studies and research, the table below lists concrete steps that governments can take to begin or accelerate a just energy transition (IISD, 2018).

Table 3-2: Implementation Steps for JET

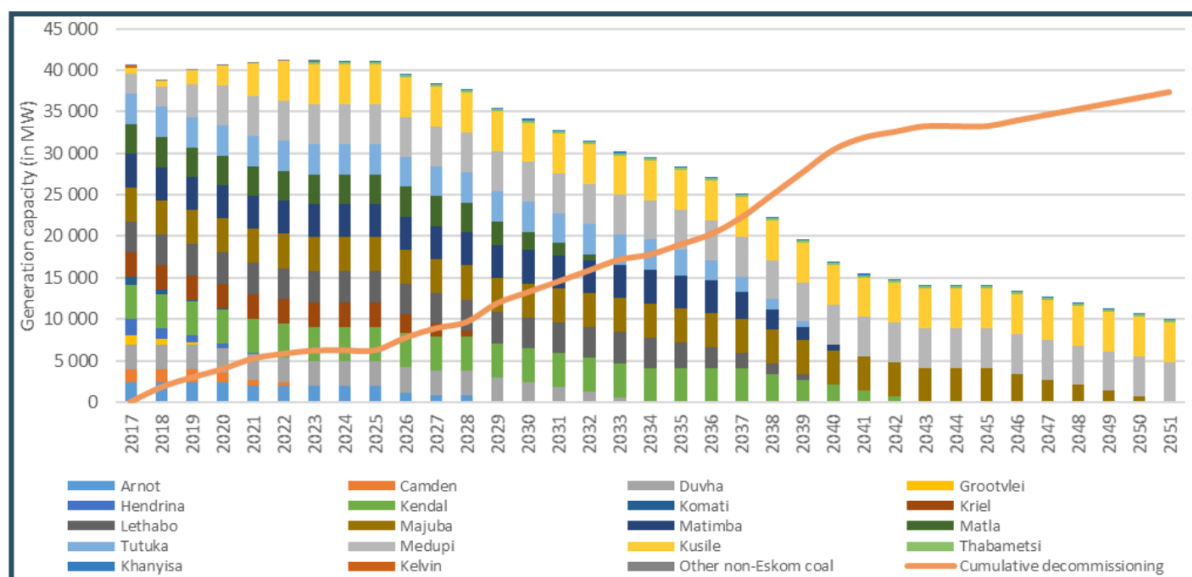
Understanding the context	<ul style="list-style-type: none"> • Map the political economy of an energy transition • Use detailed analyses of positive and negative impacts of an energy transition (at national, regional or even plant level)
Identifying champions	<ul style="list-style-type: none"> • Facilitate international and regional exchange and peer learning between countries at different stages of energy transition processes, including engagement with labour, businesses, civil society, especially for developing country contexts • Round tables at the country level to start or enhance a conversation on a just transition between all concerned stakeholders • High-level dialogue between countries in similar situations to promote the idea of a just transition at the highest levels of government (e.g., at the EU, OECD or G20 level or bilaterally)
Making the case	<ul style="list-style-type: none"> • Develop communications strategies for just energy transitions • Set up inclusive processes for "two-way communications" • Train government officials in communications
Implementing just transition measures	<ul style="list-style-type: none"> • Promote localized green jobs, including in decentralized energy and energy efficiency, and link this explicitly to the energy transition • Mobilize additional funding to promote visible and tangible just transition measures, and communicate about the benefits • Share best practices of just transition measures

Source: (International Institute for Sustainable Development, 2018)

According to Trade & Industry Policy Strategies (TIPS) (Making sense of jobs in South Africa's just energy transition: Managing the impact of a coal transition on employment, 2021), South Africa's just transition plan is both essential and conspicuously absent as the reality of a coal transition and coal power decommissioning approaches. The need to manage the transition's effects on employees and local economic development, particularly in coal-dependent regions and communities, is urgent. It is necessary to have a credible fact base from which to make suitable and widely supported decisions.

Several specific political consensuses must be brokered in this conceptual clearing in order to enable policy creation and execution, as well as investment, for a green and just transition.

Figure 3-1: South Africa's coal-based generation capacity and scheduled decommissioning



Source: (Trade & Industry Policy Strategies, 2021)

The 2019 Integrated Resource Plan (IRP) for electricity scheduled the decommissioning of Eskom’s fleet of coal-fired power stations, stipulating that 5 200 MW of coal-based generation capacity will be decommissioned by 2022, 11 000 MW by 2030, and 35 000 MW by 2050. This trajectory will fundamentally alter the energy mix in South Africa with broad socio-economic implications.

3.1.3 Likely impact of COVID-19 on the South African economy

As stated above, the impact of COVID-19 has yet to be fully quantified as the pandemic is still ongoing at the time of drafting this report. Predictions from various sources indicate that the impact of COVID-19 on the global economy may be similar or slightly worse than the global financial crisis of 2007-2008. Indeed, at this point the large declines in bank equity prices since mid-January 2020 suggest that investors are concerned about profitability and prospects for the banking sector (Adrian & Natalucci, 2020). For example, measures of bank capitalisation based on market prices are now worse than during the 2008 global financial crisis in many countries. The concern is that banks and other financial intermediaries may act as an amplifier should the crisis deepen further (Adrian & Natalucci, 2020).

Emerging markets risk bearing the heaviest burden in this time of distress. In fact, emerging markets have experienced the sharpest portfolio flow reversal on record—about \$100 billion or 0.4 percent of their GDP—posing stark challenges to more vulnerable countries (Adrian & Natalucci, 2020). South Africa has not been spared this burden, which has been exacerbated as a result of the sub-investment downgrade by credit ratings agencies in 2017 and 2020.

At a local level, sources expect the GDP of South Africa to contract between 4%-8% e-SEK (Making sense of COVID-19's impact on South African businesses, 2020) and van Week (SA's "big bazooka" stimulus package explained, 2020), with a revenue shortfall of between R 70 and R 100 billion. The budget deficit is expected to accelerate from an initial forecast of 6.8% of GDP to more than 10% (van Wyk C. , 2020).

Once this shock to the economic and social system has been dealt with at a national and international level, there will be a need to strengthen and develop the South African economy. One of the necessary components of a functional economy will be the provision of a stable electricity supply. The South African energy provision system is currently and has in the past decade been, notoriously unreliable which has had a major impact on investor confidence and the overall development of the country.

3.1.4 National sub-investment downgrades

On March 27th, 2020 Moody's Investor Service (Moody's) downgraded South Africa's long-term foreign-currency and local-currency issuer ratings to Ba1 from Baa3 (Junk Status). Moody's is the third and last of the major credit rating agencies to downgrade South Africa to junk status after Standard & Poor's and Fitch's both downgraded South Africa in 2017 (Duvenage, 2020).

While these sub-investment ratings are worrying for the country, it is difficult to understand and predict what will happen to the currency in the short and medium term and currency fluctuations may occur. This is largely as a result of global dynamics that are currently in play, in particular the appetite for safe haven assets which is a far more powerful force than any of the local challenges that are emerging (Duvenage, 2020).

One of the known impacts of the downgrade was that South Africa fell out of the World Government Bond Index (WGBI) and other popular bond indexes, an index that measures the performance of fixed-rate, local currency, investment-grade sovereign bonds. The sub-investment rating means that South Africa has dropped out of some of the widely used global bond indexes and forced international funds which track these indexes to sell South African bonds. It is estimated that between \$22-\$28 billion in capital has already flowed out of local markets since 2018 with the recent downgrade account for between \$1,5 and \$8 billion (Duvenage, 2020). This will likely result in a rise in government debt-servicing costs which could bring strain to the already frail economic system with revenue shortfalls and contraction in GDP (Duvenage, 2020). Furthermore, on the 29th of April 2020, Standard & Poors Global Ratings further downgraded South Africa's sovereign credit rating into non-investment grade citing the impact of COVID-19 on South Africa's public finances and economic growth as one of the reasons for its ratings action (Swart & Goncalves, 2020).

The downgrade casts further doubt over South Africa's ability to recover post COVID-19. Some other impacts expected from the downgrade, include the deterioration of South Africa's credit reputation, less access to conventional credit markets; deterioration in consumer and business confidence leading to a potential contraction in private investment and consumption demand; South Africa losing its status in various bond indices whereby some bond investors with mandate limitations are prohibited from buying the country's bonds; and a large forex outflow as foreign investors dump South African debt (Swart & Goncalves, 2020).

In terms of direct impacts on the construction of the proposed UEREF is that of currency fluctuations. With an unstable local currency, there may be unexpected and unplanned costs involved when importing technology for the project. The development and utilisation of local supply chains could go a long way in minimising the risks associated with currency fluctuations.

3.1.5 Assessment of business confidence levels in South Africa

The South African Chamber of Commerce and Industry (SACCI) Business Confidence Index (BCI) increased by 7.4 index points from 86.5 index points in 2020 to 93.9 index points in 2021. This was followed by a slight increase in BCI to 95.6 in March 2022. However, BCI levels continued on its recovery path after the unrests and disruptions in July 2021. The unexpected Russian military campaign in Ukraine added to uncertainty in the global business environment and caused the BCI to lose thrust after indicating a faster recovery in January and February 2022 as the Covid-19 effect waned. The SACCI BCI average for the first quarter of 2022 improved by 2.3 index points over the fourth quarter of 2021 to 95.5 and is 1.2 index points higher than the first quarter of 2021. (SACCI, 2020a) (SACCI, 2020b).

The improved BCI over the previous year is primarily due to more new vehicles sold; increased real value of building plans passed; and a stronger rand exchange rate, despite higher nominal interest rates and a still lower real prime rate than a year ago. The most prominent negative factors that hampered business confidence were higher inflation than in March 2021, lower merchandise export volumes, and significantly higher energy prices. The following indicators should be taken into consideration when analysing the business environment as they negatively contributed to the BCI:

- Energy Supply
- Exports
- Imports
- Inflation
- Share prices (SACCI, 2020a) (SACCI, 2020b).

However, there were positive contributors to the BCI, including:

- Manufacturing
- Vehicle sales
- Retail sales
- Construction – buildings
- Real finance cost
- Precious metal prices
- Rand exchange rate (SACCI, 2020a) (SACCI, 2020b).

The global economy continues to move from one uncertainty to the next, affecting economies all over the world. After the Covid-19 pandemic, global interaction and business links are once again disrupted. The global interdependence was threatened by the Covid-19 lockdown, and the conflict between Russia and Ukraine has once again exposed the vulnerability of global trade and linkages. This has an impact on supply chain logistics as well as a more pragmatic view on self-reliance where possible, putting international trade's comparative advantages under pressure. So far, the short-term effect of global reaction has been to improve on the setback of Covid19 and get economies back on track. However, the latest geopolitical conflicts should be approached with caution, as the global economy remains vulnerable and susceptible to further disruptions. Against this backdrop, South Africa's business confidence may struggle to maintain its current higher levels. The promotion of investor confidence in South Africa among both foreign and domestic investors remains critical to the country's approach to global issues.

The further development of renewable energy would likely lead to improved supply of electricity for the development of the economy. This is likely to improve business confidence in the country as sustainable energy supply is one of the key concerns of business moving forward. International investors have also noted, with concern, that the lack of availability of a consistent energy system does not lend itself to growth of Foreign Direct Investment (FDI) (Santander, 2020). The development of renewable energy systems is seen by local and foreign business owners as the future of energy generation and may increase business confidence both locally and internationally (Kovaleski, 2019).

3.1.6 Agricultural Price Increases

Fuel and diesel are commonly used for tillage, harvesting, machinery and transportation, making them a critical component for both small-scale and commercial farmers, as well as the entire agricultural value chain (Maree, 2019). According to van Wyk, (SABC News, 2018) the continuous rise in fuel price is having a negative impact on the agricultural sector.

Diesel is now the second most expensive input cost for grain farmers after fertiliser. In a country where maize is a staple food, the rise in diesel will also have a negative effect on poor communities.

Rising input costs — higher fuel, labour, fertiliser, energy and agrochemical costs for those in field crops and horticulture — are squeezing producers and calls have been made for some sort of intervention. Regarding direct input products, herbicides such as glyphosate, atrazine and metolachlor, prices were up by 99%, 33% and 32% respectively in 2021. The same trend persists in major fertilisers such as ammonium nitrate, urea and potassium chloride, the prices of which were up 107%, 58% and 125% respectively (Sihlobo & Kapuya, 2021). These increases in input costs continuously put pressure on farmers on a daily basis. It is worth mentioning that the proposed UEREF could help diversify the landowner's income, potentially helping to counter these escalating costs.

The needs and desirability section outlines the importance of the UEREF development to the economy and society at large of the country.

4 POLICY REVIEW AND PROJECT ALIGNMENT

This chapter examines the key legislation and policies relevant to the proposed development and includes a review of pertinent national, provincial and local policies that have a direct bearing on the development. Following this the chapter outlines the needs and desirability of such a development accordingly.

4.1 Policy and Planning Environment

The overall aim of this review process is to provide insight into the government's priorities and plans in terms of renewable energies. This assists in determining the relevance of the project with regard to the development objectives of the various spheres of government as well as in identifying potential developmental conflicts that the project might create. A brief review of the most relevant documents is provided in Table 4-1.

Table 4-1: Brief Overview of relevant policies

Policy	Key Policy Objectives	Source
National Policy: South Africa		
National Development Plan 2030	<ul style="list-style-type: none"> • Creating jobs and livelihoods • Expanding infrastructure • Transitioning to a low-carbon economy • Transforming urban and rural spaces • Improving education and training • Providing quality health care • Building a capable state • Transforming society and uniting the nation • Fighting corruption and enhancing accountability 	(NPC, 2012)
New Growth Path Framework 2011	<ul style="list-style-type: none"> • Infrastructure investment • Main economic sectors as employment sectors • Seizing the potential of new economies • Investing in social capital and public services • Fostering rural development and regional integration 	(South African Government, 2011)
Renewable Energy Vision 2030 South Africa	<ul style="list-style-type: none"> • Renewable energy as an exceptional source of flexible supply within the context of uncertain energy demand • Comprehensive renewable energy base will support a resilient South African future • A sustainable energy mix that excludes undue risks for the environment of society 	(World Wildlife Fund, 2014)
Integrated Resource Plan 2019	<ul style="list-style-type: none"> • The IRP (2019) has indicated that South Africa should continue to track a diversified energy mix which lessens reliance on a few primary energy sources. • The IRP document expects a total of 9 980 MW of additional wind capacity to be introduced in South Africa by 2030. The wind Independent Power Producers (IPPs) constitute the largest single renewables technology procured to date under the Renewable Energy Independent Power Producer Procurement Programme. 	(Department of Energy, 2019)

Policy	Key Policy Objectives	Source
	<ul style="list-style-type: none"> • Allocations to safeguard the development of wind energy projects aligned with the Integrated Resource Plan (IRP) 2010 should continue to be pursued: <ul style="list-style-type: none"> ○ Ensure energy security and supply ○ Reduce environmental impacts ○ Endorse job creation and localisation ○ Lessen cost of energy ○ Reduce water consumption ○ Diversify supply sources ○ Promote energy efficiency ○ Promote energy access <p>Additionally, the IRP (2019) indicates that:</p> <ul style="list-style-type: none"> • Wind energy will be 22.5% of the energy mix compared to solar at 11% by 2030 	
The Constitution of South Africa 1996	<ul style="list-style-type: none"> • “Everyone has the right to an environment that is not harmful to their health or well-being” (S24) • The environment should be protected for the benefit of present and future generations, through reasonable legislative and other measures that: <ul style="list-style-type: none"> • Prevent pollution and ecological degradation • Promote conservation • Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development 	(Republic of South Africa, 1996)
White Paper on Energy Policy of the Republic of South Africa 1998	<ul style="list-style-type: none"> • Seeks to ensure that an equitable level of national resources is invested in renewable technologies, given their potential and compared to investments in other energy supply options • Aims to create energy security by diversifying the energy supply and energy carriers 	(Department of Minerals and Energy, 1998)
White Paper on the Renewable Energy Policy of RSA 2003	<ul style="list-style-type: none"> • Pledges government support for the development, demonstration and implementation of renewable energy sources for both small and large-scale applications 	(Department of Minerals and Energy, 2003)
Provincial Policy: Mpumalanga		
Mpumalanga Economic Growth & Development Path	<ul style="list-style-type: none"> • Highlights the current economic landscape of Mpumalanga with a view of the future growth and development of the province. <p>The MEGDP identifies the following key sectors:</p> <ul style="list-style-type: none"> • Infrastructure • Green Economy • Agriculture • Mining • Manufacturing • Tourism <ul style="list-style-type: none"> • The MEGDP focus on the production of technologies for solar, wind and biofuels and is also supported by the Energy on Integrated Resource Plan 	(Mpumalanga Economic Growth & Development Path, 2011)
Mpumalanga Draft Green Economy Sector Plan, 2016	<ul style="list-style-type: none"> • The Plan aims to provide an integrated approach towards developing the green economy in Mpumalanga by 2030 in line with the Vision 2030. Specific objectives include: <ul style="list-style-type: none"> ○ Developing a sector plan based on the province’s strengths in natural resources endowments ○ Expanding on the economic, green and environmental initiatives that are already 	(DNA Economics, 2016)

Policy	Key Policy Objectives	Source
	<p>underway in the province in order to facilitate quick wins</p> <ul style="list-style-type: none"> ○ Support the DEDT's drive in sustainable economic development – Develop an action plan for implementation 	
Mpumalanga Tourism and Parks Agency Strategic Plan, 2011	<ul style="list-style-type: none"> ● The strategic plan emphasises that Mpumalanga possesses significant potential to capture large numbers of international and domestic tourists. In particular, the Kruger National Park, several other reserves, natural and cultural and historical heritage are attractions that are in demand by all tourist groups. ● The plan states that the environmental sector often puts much emphasis on biodiversity conservation without necessarily linking it with eco-tourism. The plan states that much naivety has been observed about what ecotourism can do. The plan calls for improved implementation of policy that will see biodiversity promotion being embraced by the broader tourism industry and the need for improved awareness from players within the sector to reduce the adverse environmental impacts of tourism. 	(Mpumalanga Tourism and Park Agency, 2011)
Mpumalanga Nature Conservation Act No. 10 of 1998	<ul style="list-style-type: none"> ● This Act ensures that the government of the Province of Mpumalanga shall manage the environment in such a way that the basic right of every citizen can be realised. The Act seeks to ensure that an adverse impact on the environment is limited and that the rights of all that live in the province with regard to the environment are protected. ● Applicable clauses within the bill in the context of this study include: <ul style="list-style-type: none"> ○ Provides for the transfer of hunting and other rights of a holder of a certificate of adequate enclosure. ○ Provides for the MEC's general powers in respect of wild animals. ○ Details restricted activities involving provincially protected and endangered species. ○ Stipulates obligations of holders of certificates of adequate enclosure. ○ Details permit requirements of persons and businesses operating game parks etc. 	(Mpumalanga Nature Conservation Act 10 of 1998, 1999)
District & Local Municipal Policy: Gert Sibande DM & Govan Mbeki, Lekwa and Msukaligwa LM		
Gert Sibande District Municipality IDP 2021	<ul style="list-style-type: none"> ● The Gert Sibande District IDP acknowledges green economy development as a primary objective as per the MEGDP. The IDP further states that investment in research for new technologies will be prioritised. ● The IDP identifies the need in enhancing green economy to improve service delivery in all its seven local municipalities. ● Interventions to facilitate growth and job creation in the manufacturing sector includes: <ul style="list-style-type: none"> ○ Supporting the development of clean forms of energy like wind and hydro power generations opportunities ● The IDP indicated the following issues/strategic objectives i.t.o electricity supply: <ul style="list-style-type: none"> ○ Eradication of the remaining backlogs ○ Create capacity to accommodate new developments 	(Gert Sibande District Municipality, 2021)

Policy	Key Policy Objectives	Source
Govan Mbeki Local Municipality, LED 2014	<ul style="list-style-type: none"> The LED indicates side linkage opportunities such as new energy sources (preferably renewable energy such as solar and wind) Also mentioned in the LED is rural economic sector development with renewable energy as an opportunity. Renewable energy is listed as an economic sector that the local municipality should focus on. 	(Govan Mbeki Municipality, 2014)
Govan Mbeki Local Municipality, IDP 2021	<ul style="list-style-type: none"> One of the strategic goals identified by the IDP is renewable energy and energy efficiency. The IDP states that the phasing in of renewable energy options, which include concentrated solar power, wind and natural gas, will reduce dependence on coal resources. THE IDP indicated that the local municipality support the transition to a low-carbon economy by speeding up and expanding renewable energy implementation. 	(Govan Mbeki Local Municipality, 2021)
Lekwa Local Municipality, IDP 2021	<ul style="list-style-type: none"> The IDP indicated that the electricity and energy department should develop and adopt by laws that promote renewable energy and energy efficiency. Green Economy initiatives to mitigate the negative impact of climate change & create new green job opportunities is seen as a priority area within the local municipality. 	(Lekwa Local Municipality, 2021)
Msukaligwa Local Municipality, IDP 2020/2021	<ul style="list-style-type: none"> The IDP states that considering the challenges at Eskom, Government is taking the following measures to rapidly and significantly increase generation capacity outside of Eskom: <ul style="list-style-type: none"> Enabling the development of additional grid capacity from renewable energy, natural gas, hydropower, battery storage and coal. Government will negotiate supplementary power purchase agreements to acquire additional capacity from existing wind and solar plants. Initiate the procurement of emergency power from projects that can deliver electricity into the grid within three to 12 months from approval. 	(Msukaligwa Local Municipality, 2021)

The review of the policy environment suggests that utilisation, application and investment in renewable energy sources in South Africa is considered to be an integral means of reducing the carbon footprint of the country, diversifying the national economy, reducing poverty and creating much-needed additional sources of energy. Any project contributing to the above-mentioned objectives can therefore be considered strategically important to South Africa.

From a provincial and municipal policy perspective the facilitation of renewable energy projects and interventions that relate to the broader green economy are seen as a priority in terms of the policies and strategies developed.

5 SOCIO-ECONOMIC PROFILE OF THE STUDY AREA

This section documents various aspects of the primary study area including, population and household numbers, income levels and employment. In addition, the chapter also reviews the economic structure and performance of the study area.

The intention of this review is to provide an overview of the socio-economic context of the area so as to better understand the dynamics of the area and to inform the SEIA process. The Mpumalanga Province has been identified, as well as Govan Mbeki, Lekwa and Msukaligwa local municipalities that falls within the Gert Sibande district.

5.1 Population, Income and Employment Profile

The Lekwa, Govan Mbeki and Msukaligwa Local Municipalities falls within the Gert Sibande District Municipality, whereas Govan Mbeki account for 28% of the population, and 30% of the households in the district and Lekwa 12% of the population as well as households in the district. The Msukaligwa LM accounts for 14% of the population and 15% of the Households in the DM.

Population growth between 2010 and 2020 was 1,9% (Lekwa), 2,2% (Govan Mbeki) and 2,0% (Msukaligwa) year-on-year for the local municipalities which compared favourably or similar to the district municipality (1,9%) and Mpumalanga (1,6%) over the same period. The high population growth in Govan Mbeki and Msukaligwa indicates that the municipality offers several opportunities, attracting people towards the area, this can also be motivated by the high population density (121 km²) in comparison to the other areas as well as the higher average monthly household income, which is the highest (R16 755,00) of all the areas in review.

Table 5-1: Overview of the primary study areas population structure

Indicator	Mpumalanga	Gert Sibande District Municipality	Lekwa Local Municipality	Govan Mbeki Local Municipality	Msukaligwa Local Municipality
Area (km ²)	76 495	31 840	4 585	2 954	6 015
Population	4 821 139	1 290 117	148 706	356 532	186 123
Number of Households	1 291 462	338 534	39 993	102 847	50 850
Population density (km ²)	63	41	32	121	31
Average household size	3,8	3,7	3,6	3,6	3,8
Annual population growth (2010-2020)	1,6%	1,9%	1,9%	2,2%	2,0%
Average monthly household income	R10 504	R10 851	R10 797	R16 755	R10 952

Source: Quantec Standardised Regional (2022); Stats SA (2011) forecast to 2022

The average household income for the Gert Sibande District Municipality in 2022 is estimated to be R10 851,00. The proposed UEREF will also attract additional population to the study area as several employment opportunities will be created through the development, this will ensure a sustainable population growth.

Table 5-2: Employment profile of the study areas

Indicator	Mpumalanga	Gert Sibande District Municipality	Lekwa Local Municipality	Govan Mbeki Local Municipality	Msukaligwa Local Municipality
Employed	1 112 708	302 264	42 973	108 682	48 694
Unemployment Rate	31,7%	31,0%	26,5%	28,5%	28,2%
Not Economically Active	1 420 762	379 585	40 093	89 777	52 845
Labour force participation rate	36,5%	37,0%	43,6%	44,9%	40%

Source: Quantec Standardised Regional (2022)

Table 5-2 indicates the number of people employed and not economically active, the percentage of the population unemployed as well as the labour force participation rate for areas in review. The relatively lower unemployment rate and higher labour force participation relative to the district averages further suggests that both the local municipalities are subject to inward migration due to the employment opportunities available within the local municipalities.

5.2 Economic Profile

The following subsection outlines the economic profile at a national as well as a provincial, district municipal and local municipal level.

Nationally, South Africa's Gross Domestic Product (GDP) recorded its fourth consecutive quarter growth, expanding with 1,2% in the second quarter of 2021 (April-June), this followed the increase of 1% in the first quarter (January-March). However, despite the gains made over the last four quarters, the economy is 1,4% smaller than what it was before the COVID-19 pandemic (StatsSA, 2021).

5.2.1 Regional economic profile

The GVA (Gross Value Added) of the Lekwa Local Municipality was R 19 million in 2020 (constant prices), which collectively accounts for just over 10% of the district economy's GVA, and 3% of the Mpumalanga's. The Govan Mbeki Local Municipality had a GVA of R 103 million in 2020, which accounts for 53% of the district's economy, and 17% of the province. The proposed UEREF will contribute further to the economy and ensure sustainability.

Table 5-3: Economic structure between 2010 and 2020 (constant 2015 prices; R' millions)

Sector	Mpumalanga		Gert Sibande District Municipality		Lekwa Local Municipality		Govan Mbeki Local Municipality		Msukaligwa Local Municipality	
	2010	2020	2010	2020	2010	2020	2010	2020	2010	2020
Agriculture and hunting	4,21%	6,37%	4,39%	6,56%	8,69%	13,82%	1,29%	2,65%	6,04%	7,83%
Mining and quarrying	19,81%	20,78%	17,70%	16,83%	13,39%	10,37%	19,82%	17,99%	24,76%	25,67%
Manufacturing	29,09%	24,14%	41,84%	38,12%	22,26%	14,84%	53,53%	49,61%	25,63%	25,16%
Electricity, gas and water	6,05%	5,89%	4,14%	3,82%	10,36%	5,03%	1,64%	1,87%	6,40%	8,27%
Construction	4,43%	3,58%	3,41%	3,04%	4,17%	3,58%	2,61%	2,33%	3,85%	3,55%
Trade	10,24%	9,80%	8,91%	9,21%	13,12%	15,38%	6,70%	7,56%	9,25%	7,80%
Transport and communication	5,34%	5,18%	4,07%	4,02%	5,65%	6,98%	2,53%	2,75%	6,30%	4,64%
Finance and business services	9,76%	11,88%	7,30%	9,15%	11,91%	17,83%	5,62%	6,82%	9,51%	9,93%
Community services	3,82%	4,41%	2,84%	3,22%	3,68%	4,22%	2,16%	3,03%	2,84%	2,40%
General government	7,26%	7,96%	5,40%	6,04%	6,76%	7,94%	4,09%	5,39%	5,41%	4,74%
TOTAL GVA	R602 270	R624 342	R193 719	R196 083	R20 501	R19 859	R105 648	R103 949	R25 920	R28 599

Source: Quantec Standardised Regional (2022)

The growth in the local municipalities over the last few years was largely due to the strong performance of the agriculture, trade, finance business services sectors. Manufacturing indicated a contraction in the last 10-years in the district and local municipalities but remains a large contributor in the economy. Many of these are linked to and service the large mining and manufacturing-based sectors that is present in the town of Secunda. Electricity is an average size industry in the municipalities, any new development would likely greatly increase the contribution of the utilities and construction sectors to the GVA.

Table 5-4: GVA per sector for the Lekwa, Govan Mbeki and Msukaligwa Local Municipalities (2015 constant prices; in R' millions)

Sector	Lekwa Local Municipality			Govan Mbeki Local Municipality			Msukaligwa Local Municipality		
	2010	2020	CAGR	2010	2020	CAGR	2010	2020	CAGR
Agriculture and hunting	R1 782	R2 744	4,41%	R1 360	R2 750	7,29%	R1 566	R2 238	3,64%
Mining and quarrying	R2 744	R2 060	-2,83%	R20 943	R18 699	-1,13%	R6 416	R7 341	1,35%
Manufacturing	R4 563	R2 946	-4,28%	R56 553	R51 572	-0,92%	R6 643	R7 195	0,80%
Electricity, gas and water	R2 123	R999	-7,26%	R1 733	R1 942	1,14%	R1 658	R2 365	3,62%
Construction	R854	R710	-1,83%	R2 754	R2 420	-1,29%	R998	R1 015	0,17%
Trade	R2 690	R3 054	1,28%	R7 079	R7 858	1,05%	R2 398	R2 231	-0,72%
Transport and communication	R1 158	R1 386	1,81%	R2 675	R2 861	0,67%	R1 633	R1 327	-2,05%
Finance and business services	R2 440	R3 540	3,79%	R5 941	R7 092	1,79%	R2 466	R2 840	1,42%
Community services	R755	R838	1,05%	R2 283	R3 153	3,28%	R735	R685	-0,71%
General government	R1 386	R1 577	1,30%	R4 321	R5 597	2,62%	R1 401	R1 356	-0,32%

TOTAL GVA	R20 500	R19 859	-0,32%	R105 648	R103 948	-0,16%	R25 920	R28 598	0,99%
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Source: Quantec Standardised Regional (2022)

Over the last ten years, the Compound Average Growth Rate (CAGR) of Lekwa Municipality contracted with 0,32%, whereas Govan Mbeki Local Municipality contracted with 0,16% and Msukaligwa LM increase with 0,99%. The sectors responsible for the contraction of the overall GVA a growth over the 10-year period in Lekwa Local Municipality was mining, manufacturing, utilities and construction. The mining, manufacturing and construction sectors were responsible for the overall contraction of the Govan Mbeki Local Municipality. It is a good indication that the utilities sector indicates a growth of 1,14% in the Govan Mbeki Local Municipality, the proposed UEREF will further increase this sector's performance. The increase in GVA for Msukaligwa LM is due to the strong performance in the electricity, gas and water sector, with a 3,62% growth as well as in the agriculture and hunting sector, which increase with 3,64%.

As evident by Table 5-5 the trade sector employs the most with a 24,5%, 21,7% and 18,1% contribution in 2020 in the Lekwa, Govan Mbeki and Msukaligwa Local Municipality, respectively. The utilities sector employs the least to employment in the municipalities, the proposed UEREF will increase the number of employees in this sector. The local agricultural sector includes limited subsistence (informal) farming, unlike other areas in Mpumalanga, where this practice is more dominant. The presence of this subsistence agricultural activity means that the number of households that are dependent on agricultural activities for income could be slightly greater than the figures presented in Table 5-5. This is due to the fact that the table only indicates those individuals that are formally employed in the agricultural sector.

Table 5-5: Employment structure and contribution of the Lekwa, Govan Mbeki and Msukaligwa Local Municipalities between 2010 and 2020 per economic sector

Sector	Lekwa Local Municipality		Govan Mbeki Local Municipality		Msukaligwa Local Municipality	
	2010	2020	2010	2020	2010	2020
Agriculture and hunting	16,96%	16,07%	4,52%	5,44%	17,05%	16,60%
Mining and quarrying	5,29%	4,96%	20,42%	16,20%	13,36%	15,87%
Manufacturing	8,92%	6,58%	11,48%	9,94%	7,79%	8,38%
Electricity, gas, and water	1,67%	0,76%	0,57%	0,56%	1,31%	1,68%
Construction	4,29%	4,87%	5,14%	5,58%	4,97%	6,74%
Trade	22,50%	24,47%	19,96%	21,70%	20,02%	18,10%
Transport and communication	3,18%	3,81%	2,92%	3,32%	4,22%	3,80%
Finance and business services	11,12%	13,50%	9,57%	9,89%	9,58%	10,00%
Community services	4,92%	4,91%	5,25%	6,22%	3,98%	3,46%

General government	21,15%	20,07%	20,16%	21,15%	17,72%	15,36%
TOTAL EMPLOYMENT	37 968	42 973	95 137	108 682	43 788	48 694

Source: Quantec Standardised Regional (2022)

In general, agricultural activities are relatively labour intensive, thus a small decline in the size of the sector would generally lead to greater job losses than for example in manufacturing or utilities, which tend to be more capital intensive in nature. The agricultural sector is also frequently one of the largest employers in rural areas and it is for these two reasons that the sector is generally prioritised in development strategies.

5.3 Profile of the Immediately Affected Environment

A profile of the immediately affected environment was developed utilising available secondary information and surveys conducted with landowners of the affected area. The area is illustrated in Map 6-1.

In order to develop a comprehensive understanding of formal economic activities and businesses that operate within the broader study area in which the Project is proposed, a database of farm portions and corresponding ownership was created. The intention of this database formulation, and subsequent contact with landowners was to solicit business, and enterprise-specific data, so as to better understand the economic activity and employment dynamics of the area. It should be noted that not all owners chose to respond to the survey, or to some of the specific questions.

The engagements were carried out via Survey Monkey, between June 2022 and July 2022. Table 5-6 below presents a synopsis of the engagements carried out with affected landowners. A full list of landowners contacted is presented in Annexure B.

Table 5-6: Survey & Landowner Engagements

Indicator	Number
Total farms identified	16
Total number of unique owners identified	28
Total number of owners spoken to telephonically	26
Total number of surveys distributed via emailed or electronic link	28
Total number of interviews and/or completed responses received	17

5.3.1 Land use profile of the directly affected area

The land portions on which the Project will be located are currently used for agriculture (predominant use), however, one landowner indicated that they also use the farm for tourism purposes, such as trophy hunters. This farming is in the form of livestock farming with the predominant form of livestock being beef (30% of respondents). Most of the farms earmarked for development indicated crop farming (drylands).

5.3.2 Socio-economic profile of the directly affected area

The following section presents a profile of the farms that will be directly affected by the Project. From the data obtained from surveyed landowners, it is estimated that agricultural operations in the directly affected area employ approximately 90 people, the majority of whom are permanent employees (81 people). Most of the employees live on the farm and those who do not, live on the adjacent farms as well as Bethal and Morgezon. It is recognised that the majority farms in the area practice a combination of crop and livestock activity. As such, most farms are involved in both land uses as indicated previously. The following observations were made regarding land use:

- Majority of the farmers are commercial farmers
- Beef was the largest portion of livestock, approximately 3 736 cattle, followed by sheep, with approximately 476 sheep. Two of the farmers indicated that they farm with pigs (5 pigs), one farmer indicated approximately 20 chickens. The game farmers indicated that the farm has approximately 90 animals.
- The average size of property owned was 603 ha and ranged between 172 and 1 737 ha
- The majority of labourers live on the farms they work on with their family members
- Livestock animals reared for sale and kept for production of food products include goats, sheep and cattle

Given the number of responses received from owners in the area, it has not been possible through primary research to estimate the total contribution of the agricultural industry to the local economy. The landowners that were engaged and responded are listed in Annexure

6 THE AREA OF IMPACT

6.1 Introduction

In this section a description of the area that will be impacted on is provided. The geographic area (referred to hereafter as the Area of Impact/Influence - AOI) for which the socio-economic baseline is developed is based on the assumption that the people, communities and businesses immediately surrounding the projects are likely to experience the greatest socio-economic impacts as a result of the construction and operation of the proposed project.

The socio-economic AOI is determined based on the following:

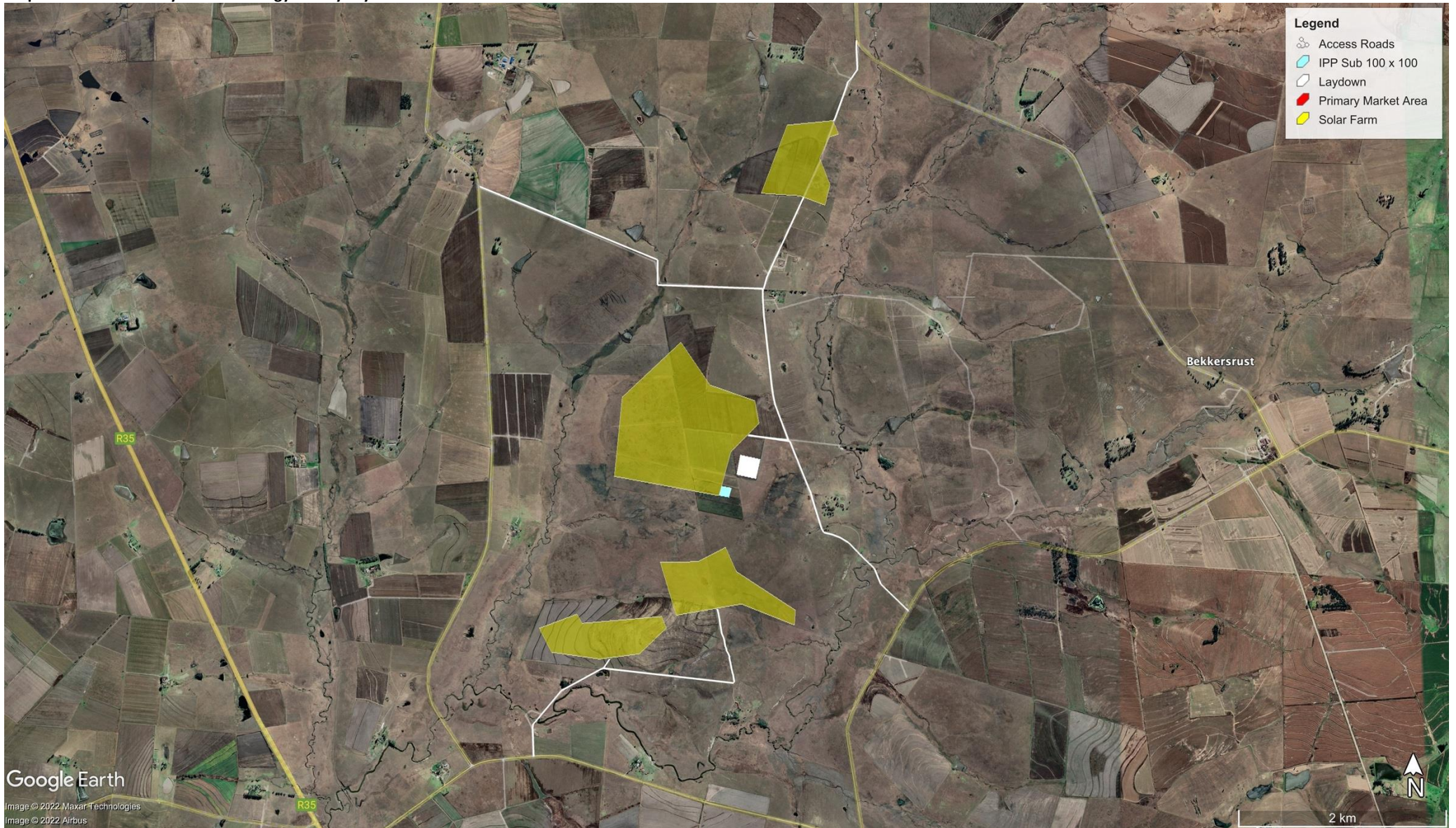
- » Assessment of the area of impact based on the construction and operation activities on the sites.
- » The nature of the activities such as the operation of heavy machines and equipment described in the preceding section, heavy vehicles and trucks moving to and from the site.
- » Distances of communities and people living from the site and areas where the activities including the transport activities will take place.
- » The likely impact of air quality, visual and noise generated on the site and along the transport routes. Note that separate air, noise and visual specialist reports are prepared that deals with these impacts in more detail.

6.2 Direct Area Of Impact

At this stage of the project, the direct AOI is seen as the total site and the roads giving access to the site. The Umbila Emoyeni Solar Energy Facility layout is indicated in Map 6-1 below.

The majority of the direct AOI covers agricultural lands with residential farmhouses and associated agricultural infrastructure. The site overlaps the R39 road on the south, some sections of the R35 on the western border, and some section of the N17 on the northern border. There are several regional farms roads that falls within the direct AOI.

Map 6-1: Ummbila Emoyeni Solar Energy Facility Layout Plan



7 POTENTIAL IMPACTS AS A RESULT OF THE PROJECT

This section of the report seeks to describe the economic impacts that are expected to occur as a result of the development of the Complex.

7.1 Impact Assessment Assumptions

This sub-section of the report describes the assumptions used in the socio-economic impact assessment study and specifically in the economic modelling exercise which aims to quantify the economic impact of the project. The assumptions presented in this section refer to construction, operation, and decommissioning assumptions applicable to the project as provided by Savannah Environmental.

7.1.1 Construction phase assumptions

The following assumptions regarding the construction phase of the Project is made:

- Construction will overlap the solar facility as well as the powerline construction.
- The total South African investment into the Project is valued at R 1 billion.
- Only local expenditure is considered in this analysis.
- The construction of the Project will create an estimated 567 (6 800 person months) project specific full time equivalent (FTE) employment positions respectively, (including foreign FTE positions) over the period of construction.

7.1.2 Operation phase assumptions

The assumptions regarding the operation phase of the Project used in the modelling exercise are as follows:

- The facility will operate for approximately 20 years.
- The operations and maintenance cost of the facility will be valued at R 10 million per annum over the 20-year operational life of the Project.
- The operation of the Project will create an estimated 33 full time equivalent (FTE) employment (including foreign FTE positions) positions annually (for 20 years) for the lifetime of the operation of the facility.

7.1.3 Decommissioning phase assumptions

The costs of decommissioning REFs are not yet known. Given the nature of solar technology and the unlimited sun resource, it is highly likely that instead of decommissioning the REFs, they will be refurbished in order to extend its lifespan beyond the 20-year period.

7.2 Economic Impacts

Economic impacts can be defined as the effects (positive or negative) on the level of economic activity in a given area(s). The net economic impact is usually measured as the expansion or contraction of an area's economy, resulting from the changes (i.e., opening, closing, expansion or contraction) of a facility, project, or programme.

7.2.1 Temporal nature of impacts

All new projects/interventions have two basic types of investments namely an initial capital injection/expenditure (CAPEX) which can take the form of either a greenfield development (i.e. new construction project on vacant land) or brownfield development (i.e. a modification of an existing structure and there is an annual investment made to maintain/operate the investment).

The economic impacts created by a capital injection (CAPEX) are once-off impacts that will only occur for the duration of construction. Thus, economic impacts associated with the construction phase are not sustainable economic impacts. Operational economic impacts, unlike capital expenditure economic impacts are sustainable and thus are calculated as an annual impact based on operational expenditure (OPEX) for a given year.

It is important to note that due to the temporal nature of CAPEX and OPEX, impacts should not be accumulated to determine the 'total' economic impact.

7.2.2 Types of economic impacts

The net economic impact of an exogenous change in the economy will be translated according to various direct and indirect economic effects, as are defined below:

- **Direct economic impacts:** These are the changes in local business activity occurring as a direct consequence of public or private activities in the economy, or public programmes and policies. Furthermore, increased user benefits lead to monetary benefits for some users and non-users (individuals and businesses) within the geographical area:
 - For affected businesses, there may be economic efficiency benefits in terms of product cost, product quality or product availability, stemming from changes in labour market access, cost of obtaining production inputs and/or cost of supplying finished products to customers. For affected residents, benefits may include reduced costs for obtaining goods and services, increased income from selling goods and services to

outsiders, and/or increased variety of work and recreational opportunities associated with greater location accessibility.

- **Indirect and induced impacts:** The direct benefits to business and the residents of communities and regions may also have broader impacts, including:
 - Indirect business impacts – business growth for suppliers to the directly affected businesses and potential growth of municipal revenue due to raised taxes and service levies.
 - Induced business impacts – business growth as the additional workers (created by direct and indirect economic impacts/effects) spend their income on food, clothing, shelter and other local goods and services.

7.2.3 Economic impacts considered

The direct and indirect economic impacts listed are measured according to the following broad economic variable categories:

- **Production/Business Sales:** refers to the value of all inter- and intra-sectoral business sales generated in the economy as a consequence of the introduction of an exogenous change in the economy. Explained more simply, new business sales equate to additional business turnover as a result of the introduction of an exogenous change in the economy.
- **Contribution to GVA:** GVA is a broader measure of the full income effect. This measure essentially reflects the sum of wage income and corporate profit generated in the study area as a result of an exogenous change in the economy.
- **Employment:** Refers to the employment resulting from the construction or operation of the project under investigation.
- **Personal Income:** Refers to the salaries and wages earned as a result of the employment generated from the development of the proposed project.

Using the Input/Output model methodology, various anticipated direct and indirect economic impacts of construction and operation phases of the proposed project have been identified. These economic impacts have been derived using an understanding of economic cause-effect relationships. The principle of cause-effect is that for any economic action, there can be a multitude of different economic reactions (effects).

7.2.4 Economic Impacts During the Construction Phase

The following table outlines the potential economic impacts during the construction phase of the Project. The total impact on production/business sales is likely to equate to R 4 billion (direct, indirect and induced) for the duration of construction and will largely be spent in Mpumalanga and Gauteng. The total impact on GDP (direct, indirect, and induced) is likely to be R 1,1 billion and create 567 FTE employment positions over the period of 24 months with the total impact on employment being 2 307 FTE employment positions. These will largely be felt through the construction sector and through the value chains associated with the construction of a solar farm.

Table 7-1: Estimated impact on the national and local economies (R' millions) as well as employment (FTE positions) for the duration of construction

Indicator	Direct	Indirect	Induced	TOTAL
<i>Impact on Production</i>	R1 000	R1 746	R1 325	R4 071
<i>Impact on Gross Domestic Product</i>	R285	R499	R378	R1 163
<i>Impact on Personal Income</i>	R136	R238	R180	R555
<i>Impact on Employment</i>	567	990	751	2 307

7.2.5 Economic Impacts During the Operation Phase

The table below provides the potential economic impacts during the operation phase of the Project, this specifically relates to the impact derived from the anticipated direct spend in the maintenance and upkeep of the facility. This does not account for the developer's mandated spend on community development projects, otherwise referred to as socio-economic development spend (SED).

The total impact on production/business sales once the project is fully operational is likely to equate to R 27 million (direct, indirect, and induced) per annum and will largely be spent in Mpumalanga and Gauteng. The total impact on GDP (direct, indirect, and induced) is likely to be R 16,4 million per year. It is anticipated that 33 South African based FTE employment positions will be created during the operational phase of the Hendrina North facility. The total impact on employment will be 88 FTE employment positions which will largely be experienced in the utilities sector and other value chains associated with solar farm operations.

Table 7-2: Estimated impact on the national and local economies (R' million) as well as employment (FTE positions) for the duration of operation

Indicator	Direct	Indirect	Induced	TOTAL
<i>Impact on Production</i>	R10,0	R8,0	R8,9	R27,0
<i>Impact on Gross Domestic Product</i>	R6,0	R4,8	R5,4	R16,4
<i>Impact on Personal Income</i>	R1,6	R1,3	R1,5	R4,5
<i>Impact on Employment</i>	33	26	29	88

7.3 Social and Socio-Economic Impacts

Socio-Economic Impact Assessments (SEIA) are instruments intended to identify and where possible quantify both economic and socio-economic impacts. Typically, socio-economic impacts are assessed from the perspective of the specific local people, households, community, business and other land-uses in the environment.

7.3.1 Construction Phase Impacts

The following sub-sections indicate the impacts that are likely to occur during the construction phase of the proposed project. Since the facility are expected to have both positive and negative effects in terms of the same indicator, the evaluation of impacts has been grouped accordingly.

7.3.1.1 *Temporary stimulation of the national and local economy (GDP and Production)*

The Project will cost R 1 billion (2022 prices) to establish. This will equate to a total impact of R 4,0 billion (direct, indirect, and induced) on production/new business sales in the country. The localised expenditure on the project will stimulate the local and national economies albeit for a temporary period of 24 months during construction. It is estimated that the project will increase the GDP directly in the country by R 285 million in 2022 prices, which will translate into a total impact of R 1,1 billion (direct, indirect, and induced) of Gross Domestic Product (GDP). These effects will take place for the duration of construction.

The greatest effects on production and GDP stimulated during construction activities will be created through the multiplier effects, specifically through a combination of production and consumption induced effects. The former refers to the impact generated along backwards linkages when the project creates demand for goods and services required for construction and subsequently stimulates the business sales of the suppliers of inputs that are required to produce these goods and services. The latter refers to the effects of household spending which is derived from an increase in salaries and wages directly and indirectly stimulated by the project's expenditure.

Sectors and industries that will experience the greatest stimulus from this expenditure include:

- Basic metals, structural metal products and other fabricated metal products industries
- Trade
- Insurance
- Transport services
- Electrical machinery and apparatus

Increased Production:

Nature: Expenditure associated with the construction of the proposed 150MW Solar PV Facility will impact on the production of the local economy		
	Without enhancement	With enhancement
Extent	National (4)	National (4)
Duration	Short-term (1)	Short-term (1)
Magnitude	High (8)	High (8)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (52)	Medium (52)
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes
Enhancement: <ul style="list-style-type: none"> » The project developer should use locally sourced inputs where feasible in order to maximize the benefit to the local economy. » Sub-contracting of local construction companies to occur as far as possible for the construction of facilities. 		
Residual Impact: Short term Economic injection into the local and regional economy.		

Impact on GDP:

Nature: Temporary increase in country's GDP due to capital expenditure during the construction period		
	Without enhancement	With enhancement
Extent	National (4)	National (4)
Duration	Short-term (1)	Short-term (1)
Magnitude	High (8)	High (8)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (52)	Medium (52)
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes
Enhancement: <ul style="list-style-type: none"> » The project developer is to use locally sourced inputs where feasible in order to maximize the benefit to the economy. 		
Residual Impact: Short term Economic injection into the local and regional economy.		

7.3.1.2 Temporary increase employment in the national and local economies

The construction of the facility will create 567 (6 800 person months) Full Time Equivalent (FTE) employment positions over the course of the development. The total number of jobs that will be created is estimated to 2 307 (including direct, indirect and induced). Given the size of the construction sector within the municipality, it is anticipated that there will be sufficient local labour to satisfy the demand for 567 South African based construction workers. Furthermore, if most of the local staff comes from the Local Municipality it will have a positive effect on local unemployment. Beyond the direct employment opportunities that will be created by the project during the construction phase the development will also have a positive spin-off effect on the employment situation in other sectors of the national and local economies.

Through the procurement of local goods (i.e., consumption induced effects) the project will support an estimated total of 990 FTE employment positions (indirect). Most of these positions will be in sectors such as construction, business services and trade. The expenditure on the project outside of the local economies will also have a positive effect on employment creation, albeit for a temporary period of 24 months.

Through the production and consumption induced impacts the project is envisioned to create an estimated additional 751 FTE employment (induced) positions. Given that a significant portion of the multiplier effects will be generated through backward linkages, more than half of these FTE employment positions will be created along the supply chain and amongst industries providing inputs to the businesses in the supply chain. Throughout the construction phase it is recommended that the developer encourage the EPC contractor to fill as many local positions as possible using labour from within the Local Municipality rather than from outside of the municipal boundaries.

Nature: The construction of the 150MW Solar PV Facility will positively impact the community and beyond by creating a number of job opportunities (albeit temporary).		
	Without enhancement	With enhancement
Extent	Regional (3)	Regional (3)
Duration	Short-term (1)	Short-term (1)
Magnitude	Moderate (6)	Moderate (6)
Probability	Definite (5)	Definite (5)
Significance	Medium (50)	Medium (50)
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes
Enhancement:		
» Organise local community meetings to advise the local labour on the project that is planned to be established and the jobs that can potentially be applied for.		
» Where feasible, effort must be made to employ locally in order to create maximum benefit for the communities.		
Residual Impact: No residual impacts are applicable.		

7.3.1.3 Contribution to skills development in the country and local economy

The construction of the proposed facility is likely to have a positive impact on the skills development in South Africa. During the solar panel component assembly and structure manufacturing period which is included as part of the construction phase and is planned to be conducted in Mpumalanga, it is likely that foreign technical experts will be involved. This will present an opportunity for skills and knowledge transfer between these technical experts and local manufacturers. It is also expected that the construction staff involved in the project will gain knowledge and experience in respect of the development of solar energy facilities.

More skilled local construction staff would most likely also lower the cost of future solar projects in the province. In addition to the direct effects of the project on skills development in the country and the local economy, the project could contribute to the development of the local research and development (R&D) and manufacturing industries associated with solar technology. This could be achieved through partnerships with the University of Mpumalanga (situated in the Mbombela Local Municipality). Partnerships of this nature could further enhance the development of new skills and expertise.

Nature: Employees will develop and enhance skills thereby increasing experience and knowledge.		
	Without enhancement	With enhancement
Extent	Regional (3)	Regional (3)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (4)	Moderate (5)
Probability	Definite (5)	Definite (5)
Significance	Medium (60)	High (65)
Status (positive or negative)	Positive	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Enhancement:		
<ul style="list-style-type: none"> » In order to maximise the positive impact, it is suggested that the project company provide training courses for employees where feasible to ensure that employees gain as much as possible from the work experience. » Facilitate the transfer of knowledge between experienced employees and the staff. » Perform a skills audit to determine the potential skills that could be sourced in the area. 		
Residual Impact:		
Skills developed during the project can be utilised in future.		

7.3.1.4 *Temporary increase in household earnings*

The proposed Project will create an estimated total of 2 307 South African based FTE employment positions during construction generating R 555,1 million of revenue for the affected households in the country through direct, indirect, and induced effects. Of this figure R 136,3 million will be paid out in the form of salaries and wages to those individuals directly employed during the construction phase. The remaining R 418,7 million in households' earnings will be generated through indirect and induced effects resulting from project expenditure. Although temporary, this increase in household earnings will have a positive effect on the standard of living for these households. This is especially applicable to the households benefitting from the project that reside in the Local Municipality and broader Mpumalanga.

Nature: Employed individuals will increase the income of their respective households and thereby experience an improvement in their standard of living.		
	Without enhancement	With enhancement
Extent	Local (2)	Local (2)
Duration	Short-term (1)	Short-term (1)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (36)	Medium (36)
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes
Enhancement: » Local employment will benefit local households and the local area.		
Residual Impacts: No residual impacts are applicable.		

7.3.1.5 Temporary increase in government revenue

The investment in the Project will generate revenue for the government during the construction period through a combination of personal income tax, VAT, companies' tax etc. Additional government revenue will also be earned through corporate income tax, however since the gross operating surplus of the EPC contractor employed to construct the facility is not known, an estimate of the overall corporate income tax value is not possible at this stage. Government earnings will be distributed by national government to cover public spending which includes amongst others the provision and maintenance of transport infrastructure, health, and education services as well as other public goods.

Nature: The investment in the facility will generate revenue for the government during the construction period through a combination of personal income tax, VAT, companies' tax etc.		
	Without enhancement	With enhancement
Extent	Local (2)	Local (2)
Duration	Short-term (1)	Short-term (1)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (36)	Medium (36)
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	No
Enhancement: » N/A		
Residual Impacts: No residual impacts are applicable.		

7.3.1.6 Negative changes to the sense of place

A community's sense of place is developed over time as it embraces the surrounding environment, becomes familiar with its physical properties, and creates its own history. The sense of place is created through the interaction of a number of different factors such as the area's visual resources, its aesthetics, climate, culture, and heritage as well as the lifestyle of individuals that live in and visit the area.

Most importantly, it is a highly subjective matter and dependent on the demographics of the population that resides in the area and their perceptions regarding trade-offs. For example, a community living in poverty is generally more likely to be accepting of industrial-type development that promises employment opportunities while a more affluent residential area is more likely to oppose such a development on the grounds that the development is not likely to generate gains for the community (Sinding, 2009). The area proposed for the development as well as its surrounds does have large-scale agricultural activities and operations. Any rapid changes that alter the characteristics that define the area's sense of place could potentially have a negative impact to the local population's sense of place. However, during the landowner's survey, no concern of visual impacts was recorded.

During the construction of the proposed Project there are likely to be noise and dust impacts caused by the movement of vehicles as well as construction activities on site. These impacts are anticipated to occur primarily during the day with illumination from the site being experienced during the night. The presence of this noise is likely to alter the way the surrounding environment is experienced by households in the area. As construction activities progress and the footprint of the facility grows, the visual impact will also become more apparent, and the sense of place experienced by households residing within the visually affected area will be altered further.

It is anticipated that residents residing on the farms on which solar panels and associated infrastructure are proposed to be established will experience the greatest disruption in their sense of place during the construction period. Individuals who live on the surrounding farms will, over the course of the construction phase of the project, be subjected to either visual or noise disruptions that are currently not present in the area. The sense of place at the farms located adjacent to or beyond the site of the proposed Project will also be affected to some extent. The Project will be visible from several of these farms. The visual exposure on all these farms during the construction phase will not be continuous given the proximity of some of the farms from the proposed Project.

Nevertheless, the knowledge of the REFs and associated infrastructure near the farm and the fact that it could be seen from some parts will still have a negative connotation and will alter the sense of place experienced by the households residing on these farms. As stated, the sense of place of local residents is likely to begin to be altered once the construction of the proposed Project begins.

Visual impacts will, however, remain for the entire operation of the Project, this means that although the effect on the sense of place could be relatively small considering the population to be affected, the duration of the impact increases it significantly. It is advisable that all efforts be made to address the factors that will affect individual's sense of place such as visual effects and noise pollution to make them less intrusive.

However, according to the landowners in the area, the proposed project will have a low significant impact on the sense of place/visual impacts, due to the physical characteristics of the study area.

Nature: Sense of place impacts (visual, noise and dust).		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Short duration (1)	Short duration (1)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (32)	Low (24)
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation:		
<ul style="list-style-type: none"> » Ensure proper health and safety plans in place during the construction period to ensure safety on and around site during construction » Install screens around the construction site to reduce the visual impact of construction on surrounding properties » Site watering (or use of appropriate dust suppressant) from time to time to reduce dust emitting from the construction site 		
Residual Impacts:		
No residual impacts are applicable.		

7.3.1.7 Safety and Security

The perception exists from the landowners that an influx of jobseekers, and / or construction workers to an area is a contributor to increased criminal activities in an area, such as increased safety and security risk for neighbouring properties and damage to property, increased risk of veld fire, stock theft, and crime etc. It is confirmed by the client that patrols will be put in place to ensure the safety of the infrastructure and the household where the Project will be located.

Nature: The in-migration of job seekers to the area could be perceived to result in increased criminal activity.		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Short duration (1)	Short duration (1)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Low (27)	Low (18)
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation:		
<ul style="list-style-type: none"> » Have a detailed consultation and communication plan with neighbouring property owners to keep them informed with regards to construction progress, issues and potential dangers » Ensure proper health and safety plans in place during the construction period to ensure safety on and around site during construction, including fencing of the property and site access restriction 		
Residual Impacts:		
A minimal amount of migrant labour will be employed by the proposed project and remain in the area.		

7.3.1.8 Negative impact on the local agricultural operations

As construction begins at the proposed site, disturbances will likely be minimal. The presence of construction machinery, increased traffic to and from the site (transporting staff, equipment, and material) and staff on or near the site will likely be the largest disturbances.

The longer construction continues, the greater the disturbances will likely be. As the panels and infrastructure are erected there is likely to be an increased disturbance as panels and structures become increasingly visible in the surrounding area. Once construction is completed the disturbances associated with the vehicular traffic, equipment and staff will be reduced and the remaining disturbance will be that of the solar farm itself. According to the landowner's survey's they indicated that some agricultural land will be lost, interference with agricultural activities (especially large implements) and aerial spraying will be the negative influences, as well as reconstruction of animal camps and access roads, however, they indicated that they are not sure on the amount and which infrastructure will be located on their properties. Thus, the initial impact on the agricultural operations will be minor. This will be confirmed by the agricultural assessment.

Nature: Loss of agricultural space		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Short duration (1)	Short duration (1)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (32)	Low (24)
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation: » Construct the solar panels on parts where the least arable land will be affected.		
Residual Impacts: No residual impacts are applicable.		

7.3.1.9 Temporary increase in social conflicts associated with the influx of people

Neither the local nor the surrounding municipalities are sufficiently diversified to supply the entire workforce for the construction of the proposed Project, particularly in terms of skilled positions. A significant number of the unskilled and semi-skilled workers required during the construction phase will however be sourced locally. In addition, given the scale and extent of the development, the project is likely to attract job seekers from other parts of the country, particularly from within Mpumalanga and Gauteng. This would be in addition to the migrant workers contracted to work on the project. The migration of people to the area could result in social conflicts between the local population and the migrant work force as the local population could perceive these migrant workers as “stealing” their employment opportunities. Likewise, the influx of people into the area, could potentially lead to a temporary increase in the level of crime, illicit activity and possibly a deterioration of the health of the local community through the spread of infectious diseases. Semi-skilled and unskilled construction workers could also choose to remain in the area following the completion of the construction phase. Without any form of income these individuals run the risk of exacerbating the level of poverty within the Local Municipality.

Aside from the broader community issues the increase in the number of people in the area is likely to have an adverse effect on crime levels, incidents of trespassing, development of informal trading and littering. There is also potentially a likelihood of increased stock theft. The influx of job seekers and the potential social conflicts that can arise with in-migration of temporary workers to an area is difficult to mitigate. Appropriate awareness campaigns and strict adherence to recruiting practices could, however, reduce the extent of the adverse effect. Addressing the challenges related to potential social impacts is best done in partnership with all stakeholders in the area, specifically the affected and adjacent property owners, local communities, ward communities and municipalities.

This would promote transparency; information sharing and help build good relationships between all affected parties. In addition, all opportunities that would include the community in the project should be explored and where possible implemented. Employment opportunities, including the provision of ancillary services, are particularly relevant in this incidence as the creation of employment opportunities for locals could eliminate the potential alienation between the community and the project as well as migrant workers.

Nature: An impact on the demographics of the area as a result of in-migration in response to job opportunities will occur.		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Short duration (1)	Short duration (1)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Low (27)	Low (18)
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation:		
» Where feasible, effort must be made to employ local labour in order to create maximum benefit for the communities and limit in-migration.		
» Train unemployed local community members with insufficient skills and increase absorption of local labour thereby decreasing in-migration.		
Residual Impacts:		
Workers remaining after the construction period without work will put strain on public resources.		

7.3.1.10 Impacts on economic and social infrastructure

The Project will create and estimated 567 FTE employment positions (South African based positions) for the duration of the project. Given that these workers will require services there is likely to be an increase in the demand for social services, access to water and electricity. Given the proximity of the development site to Bethal, it is most likely that the health facilities in the area will experience additional demand for medical services brought about by the influx of job seekers.

These connections will, however, be minimal and it is unlikely to alter the demand significantly. The effects of the project on road infrastructure should also be considered as it is highly likely that the development will lead to an increase in traffic volumes on surrounding roads. The deterioration of these roads could place additional financial burdens on the municipality through additional maintenance costs. Additional traffic volumes are also likely to impact the condition of secondary roads used to access surrounding farms. The transport study will confirm the impact on roads for the Project.

Based on the above discussion it is expected that the basic service provision, health facilities and road infrastructure will be under additional strain during the construction period. Given that the project is anticipated to attract additional people to the area the significance of the impact is considered to be medium. These impacts can however be mitigated if the developer engages with the local municipalities and plans accordingly.

Nature: An increase in traffic due to construction vehicles and heavy vehicles could create short-term disruptions and safety hazards for current road users.		
	Without mitigation	With mitigation
Extent	Local (2)	Local (1)
Duration	Short duration (1)	Short duration (1)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (36)	Low (24)
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation:		
<ul style="list-style-type: none"> » Provide public transportation service for workers in order to reduce congestion on roads » Partner with local municipalities and other prominent users of the local roads to upgrade them to meet the required capacity and intensity of the vehicles related to the planned construction activities » Transportation contractors must adhere to the road rules and regulations » Utilise only designated access routes & entrance/exits from the site » Implement appropriate signage & road safety measures at entrance/exit to the site and on site 		
Residual Impacts:		
No residual impacts are applicable.		

7.3.2 Operation Phase Impacts

The following sub-section describes the impact that the proposed 150 MW Solar Farm will have once it is operational. The facility is envisaged to have a long lifespan, which means that the impacts observed during this phase, regardless of whether the impacts are positive or negative, will be long-lasting.

7.3.2.1 Sustainable increase in production and GDP nationally and locally

The proposed facility will require an annual operational expenditure of R 10 million over 20 years. The total impact on production in the country as a result of the project's operations will equate to R 27,0 million per annum in 2022 prices for the 20 years. Aside from the utilities sector, industries that will experience the greatest stimulus from the project will include electrical machinery and apparatus, insurance, trade, transport service and chemical production industry. It is estimated that the project will generate R 16,4 million of value add per year over the 20-year period (comprising gross operating surplus before taxes and labour) and taxes.

The production and consumption induced multiplier effects of the project are considered to be relatively small compared to conventional electricity generating industries. This is because the energy source used to produce electricity by the proposed solar energy facility is free, unlike conventional power stations where raw inputs (i.e., coal) and the transport thereof comprise a significant portion of operating expenditure. It is for this reason that such a facility is a highly attractive business venture.

In addition to the positive production and GDP impacts arising from expenditure related to the operation of the facility, the local economy is anticipated to be positively stimulated by expenditure related to the developer’s intended socio-economic development contributions in the immediate area. The contribution to the Local Municipality, although small relative to the combined size of the municipality’s economy, will nevertheless be positive and more importantly, a sustainable contribution.

Increased Production:

Nature: Expenditure associated with the operation of the proposed Solar PV Facility will have a positive impact on production.		
	Without enhancement	With enhancement
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)
Significance	Moderate (48)	Moderate (48)
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes
Enhancement:		
» The project developer should make effort to use locally sourced inputs where feasible in order to maximize the benefit to the local economy.		
» Local Small and Medium Enterprises are to be approached to investigate the opportunities for supplying inputs required for the maintenance and operation of the facility, as far as feasible.		
Residual Impacts: No residual impacts are applicable.		

Impact on GDP:

Nature: Positive impact on GDP due to operating expenditure during operations.		
	Without enhancement	With enhancement
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)
Significance	Moderate (48)	Moderate (48)
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes
Enhancement:		

- » The project developer is to make an effort to use locally sourced inputs where feasible in order to maximize the benefit to the local economy.
- » Local Small and Medium Enterprises are to be approached to investigate the opportunities for supplying inputs required for the maintenance and operation of the facility, as far as feasible.

Residual Impacts:

No residual impacts are applicable.

7.3.2.2 Creation of sustainable employment positions nationally and locally

The proposed Project will create an estimated 33 permanent employment positions across the operation phase of the development which, will be retained for approximately 20 years. Of these, an estimated 33 will be South African based positions. It is envisaged that some of the skilled and low skilled staff will be employed from within the local area with the remaining staff being sourced from other parts of Mpumalanga and the country. Aside from the direct employment opportunities, the facility will support an estimated 29 FTE employment positions created through the production and consumption induced effects.

Due to the spatial allocation of procurement spending and direct employment created, most of the indirect and induced positions will also be created within the local area. The trade, agriculture and community and personal services sectors will benefit the most from these new employment opportunities.

Nature:		
The Solar PV Facility will create additional employment due to maintenance of the solar panels.		
	Without enhancement	With enhancement
Extent	Local (1)	Local (1)
Duration	Long-term (4)	Long-term (4)
Magnitude	Minor (2)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Low (21)	Low (21)
Status (positive or negative)	Positive	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes (enhance)	Yes
Enhancement:		
» Where feasible, effort must be made to employ locally in order to create maximum benefit for the communities.		
Residual Impacts:		
No residual impacts are applicable.		

7.3.2.3 Improved standards of living for benefiting households

The creation of an estimated 33 FTE employment positions throughout the country will generate R1,67 million of personal income (2022 prices), which will be sustained for the entire duration of the Project's lifespan. Given the average household size in affected local municipalities and nationally, this increase in household earnings will support several people.

The sustainable income generated as a result of the Project's operation will positively affect the standard of living of all benefitting households. This is specifically applicable to the Local Municipality, as the average income per employee at the facility would far exceed the average household income within these municipalities. Skills development coupled with sustainable employment creation opportunities as a result of the Developer's intended SED spend, are expected to contribute towards an improved standard of living amongst families that might not have had a sustainable income previously.

Nature: Employed individuals will increase the income of their respective households and therefore improve their standard of living.		
	Without enhancement	With enhancement
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	Medium (48)	Medium (48)
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Enhancement: » Employing locally will increase benefit to local households and the local area.		
Residual Impacts: No residual impacts are applicable.		

7.3.2.4 Sustainable increase in national and local government revenue

The proposed Project will, through property taxes and salaries and wages payments, contribute towards both local and national government revenue. At a local level, the Project will contribute to local government through payments for utilities used in the operation of the Project. It will also increase its revenue through an increase in property taxes compared to the current level. Given that the Local Municipality has a relatively small economy, any additional income would greatly benefit the Municipality.

On a national level, the revenue derived by the Project during its operations, as well as the payment of salaries and wages to permanent employees will contribute to the national fiscus. Although it is impossible to trace exactly how such revenue is allocated, any additional revenue generated means that national governments can increase its spending on public goods and services.

Nature: Government revenue will be derived from the proposed development.		
	Without enhancement	With enhancement
Extent	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	Medium (48)	Medium (48)
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	No
Mitigation: No mitigation measures are required.		
Residual Impacts: No residual impacts are applicable.		

7.3.2.5 Sustainable rental revenue for farms where the solar farm is located

It is anticipated that farms where the solar panels are located on will enter into a rental agreement with the developer. The owners will likely thus receive rental revenue as a result of hosting the infrastructure on their property. The revenue that the owners of the properties receive will have a positive impact on the local economies especially if spent in the local area. This revenue is also likely to assist local property owners in dealing with economic shocks to their current business activities such as drought or unfavourable economic conditions that currently prevail. The revenue generated from the rental of land for the infrastructure will additionally assist farmers in investing in new technologies to improve the efficiencies of their current agricultural practices and allow farmers to better compete in the open market.

While these impacts are notably only for those farmers who have infrastructure located on their properties, the impact of additional revenue is likely to be very significant to those impacted.

Nature: Increase in revenue due to rental paid for landowners where the solar panels will be located		
	Without enhancement	With enhancement
Extent	Local (2)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly Probable (4)	Highly Probable (4)
Significance	Medium (48)	Medium (48)
Status (positive or negative)	Positive	Positive
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	No
Enhancement: » No mitigation measures are required.		
Residual Impacts: No residual impacts are applicable.		

7.3.2.6 Sustainable increase in electricity available for the local region and South Africa

The development of the solar farm will lead to a sustainable increase in the supply of electricity for the country. It was noted in Section 3 that lack of electricity and load shedding has had a notable impact on the economy of the country and is one of the reasons stated by foreign investors for the lack of investment in the country. With an improved supply of power to industry, there is likely to be an improvement in the economy as a whole.

It should be noted that while these solar farms alone are unlikely to make a large impact in the shortages of electricity in the country, the cumulative impact of all the proposed solar energy products in the country will be substantial. The combined energy production for the Project will be up to 600 MW which begins to reflect a notable positive injection into the energy generation capacity from the region.

Nature: Improved energy security and energy sector will result due to the development of the 150MW Solar PV Facility.		
	Without enhancement	With enhancement
Extent	National (5)	National (5)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)
Significance	High (60)	High (60)
Status (positive or negative)	Positive	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	No	No
Mitigation: No mitigation measures are required.		
Residual Impacts: No residual impacts are applicable.		

7.3.2.7 Negative changes to the sense of place

The effects on the community's sense of place will initially be felt during the construction period and will continue into the operation phase. The assessment of the negative change in the sense of place that was examined in the construction phase will likely be in place during the operation phase due to the long-term presence of Project infrastructure. However, according to the landowners' survey, the Project will not have a significant negative impact on the sense of place.

Nature: Visual and sense of place impacts.		
	Without enhancement	With enhancement
Extent	Local (2)	Local (2)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Definite (5)	Definite (5)
Significance	Medium (50)	Medium (50)
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	No	No
Mitigation: No mitigation measures are required.		
Residual Impacts: No residual risks are applicable.		

7.3.2.8 Negative impact on agricultural operations

The impact of agricultural land was assessed through a survey that was distributed among the landowners. According to the landowner's survey's they indicated that some agricultural land will be lost, interference with agricultural activities (especially large implements) and aerial spraying will be the negative influences, as well as reconstruction of animal camps and access roads, however, they indicated that they are not sure on the amount and which infrastructure will be located on their properties. Thus, the initial impact on the agricultural operations will be minor. This will be confirmed by the agricultural assessment.

Nature: Loss of agricultural space		
	Without mitigation	With mitigation
Extent	Local (1)	Local (1)
Duration	Long Term (4)	Long Term (4)
Magnitude	Low (4)	Low (4)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (36)	Medium (36)
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Medium
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation: » Construct the solar panels on parts where the least arable land will be affected.		
Residual Impacts: No residual impacts are applicable.		

7.3.3 Decommissioning Phase Impacts

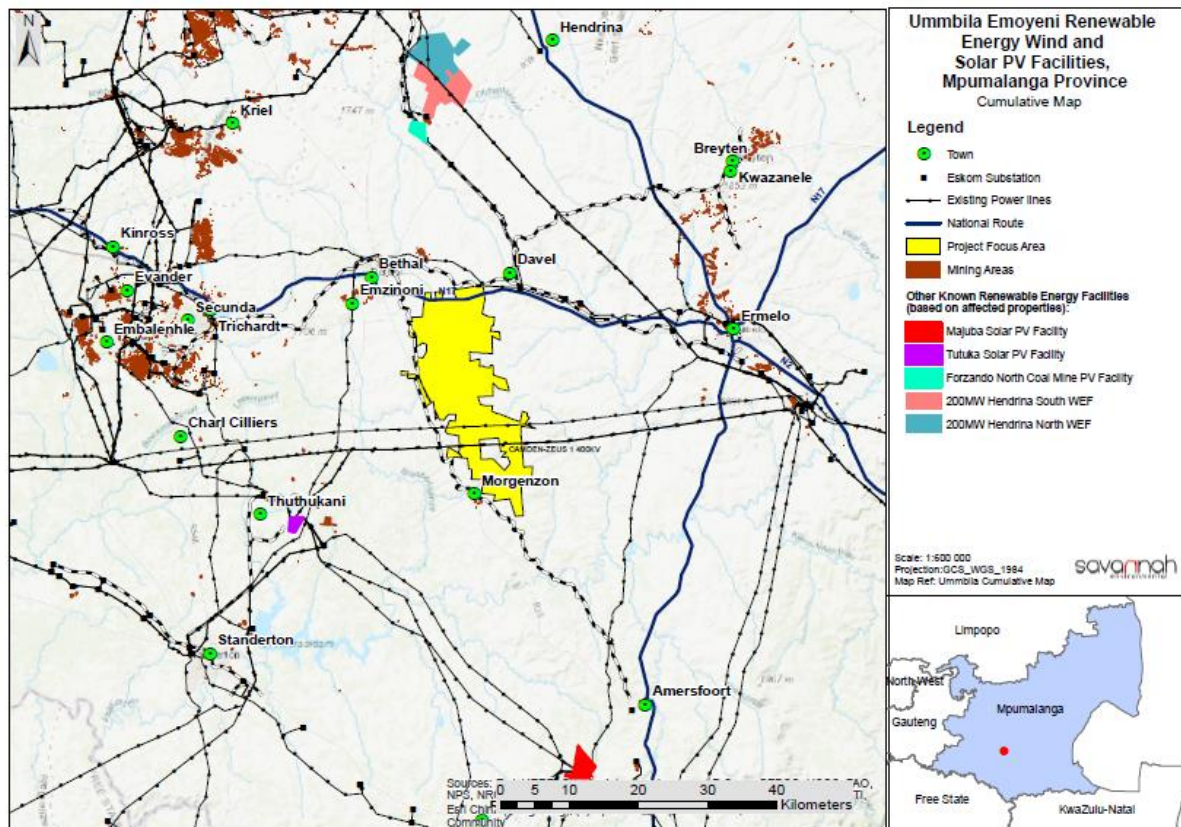
Upon the expiry of the solar farm's lifespan, the facility would need to be disbanded, although the facility would likely be upgraded in order to maintain and prolong the lifespan of the facility. If the facility is decommissioned, the land will be rehabilitated in order to return it to pre-project conditions.

This also means that all impacts whether positive or negative, which take place during the operation phase will cease to exist. At the same time spending on the disassembly of the components and rehabilitation of land will increase the demand for construction services and other industries, thus stimulating economic activity in the local area, albeit over a temporary period. Socio-economic impacts stimulated during the decommissioning phase are expected to be similar to those that took place during the construction phase. However, people who were permanently employed at the facility during the operational phase will lose their jobs during the decommissioning phase.

7.4 Cumulative Impacts

Other known renewable energy facilities could be identified that will create the conditions for cumulative effect.

Map 7-1: Existing Electricity Infrastructure and Planned Renewable Energy



Source: Savannah Environmental, 2020

Below are additional recent projects that will contribute to positive and negative cumulative impact:

- Majuba Solar PV Facility
- Tutuka Solar PV Facility
- Forzando North Coal Mine PV Facility
- Hendrina South WEF

- Hendrina North WEF

Only the cumulative impacts that will have the potential for a significant influence will be analysed.

Table 7-3: Socio-economic impacts identified to be associated with the other projects in the zone of influence of the facility under review

Socio- Economic Impact	Description	Status
Increase in Production	The initial investment spend on the project will inject significant business sales/ production for the local and regional economy. The economic impact arising from the initial investment will be felt throughout the economy with windfall effects benefitting related sectors in the economy.	Positive
Employment Creation	Increase in employment creation for the local workforce.	Positive
Demographic Shifts	Influx of migrant labour and job seekers due to job opportunities presented by numerous projects.	Negative

In addition to the negative cumulative impact noted above, numerous positive impacts are expected to accumulate in the region such as increased production, GDP, employment, skills and household income.

The following tables summarise and rate the expected cumulative effects.

Improved Economic Production:

Nature: Increase in economic production.		
	Cumulative Contribution of proposed project	Cumulative Impact without proposed project
Extent	Regional (3)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	High (8)
Probability	Probable (3)	Probable (3)
Significance	Medium (45)	Medium (45)
Status (positive or negative)	Positive	Positive
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Confidence in findings	High	
Mitigation: No mitigation measures are required.		

Improved Number of Employment Opportunities:

Nature: Increase in the number of employment opportunities.		
	Cumulative Contribution of proposed project	Cumulative Impact without proposed project
Extent	Regional (3)	Regional (3)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	High (8)
Probability	Probable (3)	Probable (3)
Significance	Medium (45)	Medium (45)
Status (positive or negative)	Positive	Positive
Reversibility	Low	Low

Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Confidence in findings	High	
Enhancement:		
» Employment of local residents as far as possible should be encouraged.		

Demographic Shifts:

Nature:		
Influx of migrant labour and job seekers due to job opportunities presented by numerous projects.		
	Cumulative Contribution of proposed project	Cumulative Impact without proposed project
Extent	Regional (3)	Regional (3)
Duration	Medium term (3)	Medium term (3)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly probable (4)	Highly probable (4)
Significance	Medium (48)	Medium (48)
Status (positive or negative)	Negative	Negative
Reversibility	Medium	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Confidence in findings	High	
Mitigation:		
» Where feasible, effort must be made to employ local labour in order to create maximum benefit for the communities and limit in-migration.		
» Provide training for unemployed local community members with insufficient skills and thus increase absorption of local labour thereby decreasing in-migration.		
» Manage recruitment and marketing for vacancies with a preference of residents within the municipality.		

8 CONCLUSION AND RECOMMENDATIONS

8.1 Conclusion

This EIA Report focused on the collection of available secondary and primary information in order to provide a social analysis against which potential social impacts which may be associated with the development of the 150MW Solar PV Facility. A summary of the potential positive and negative impacts identified for the detailed design and construction, and operation phase are presented in Table 8-1 and Table 8-2.

Table 8-1: Summary of potential social impacts identified for the detailed design and construction phase

Impact	Status	Without Enhancement	With Enhancement
Impact on Production	Positive	Medium (52)	Medium (52)
Impact on GDP	Positive	Medium (52)	Medium (52)
Impact on Employment Creation	Positive	Medium (50)	Medium (50)
Skills Development	Positive	Medium (60)	High (65)
Household Income and Standard of Living	Positive	Medium (36)	Medium (36)
Temporary increase in government revenue	Positive	Medium (36)	Medium (36)
Change in sense of place	Negative	Medium (32)	Low (24)
Safety and Security	Negative	Low (27)	Low (18)
Agricultural Operations	Negative	Medium (32)	Low (24)
Influx of people	Negative	Low (27)	Low (18)
Daily movement patterns	Negative	Medium (36)	Low (24)

Table 8-2: Summary of potential social impacts identified for the operational phase

Impact	Status	Without Enhancement	With Enhancement
Impact on Production	Positive	Medium (48)	Medium (48)
Impact on GDP	Positive	Medium (48)	Medium (48)
Employment Creation	Positive	Low (21)	Low (21)
Household Income and Standard of Living	Positive	Medium (48)	Medium (48)
Increase in government revenue	Positive	Medium (48)	Medium (48)
Rental revenue for landowners	Positive	Medium (48)	Medium (48)
Improvement in Energy Sector Generation	Positive	High (60)	High (60)
Visual and Sense of Place Impacts	Negative	Medium (50)	Medium (50)
Impact on agricultural operations	Negative	Medium (36)	Medium (36)

Table 8-3: Summary of cumulative social and economic impacts.

Impact	Status	Cumulative Contribution of proposed project	Cumulative Impact without proposed project
Increase in Production, GDP	Positive	Medium (45)	Medium (45)
Increase in the number of Employment Opportunities	Positive	Medium (45)	Medium (45)
Influx of migrant labour and job seekers	Negative	Medium (48)	Medium (48)

The potential social and economic impacts identified for the project and listed within Table 8-1 and Table 8-2 have been identified based on an assessment of available information and the current understanding of the proposed project and are not exhaustive.

8.2 Recommendations

Based on the information presented in this report, the following can be recommended from the socio-economic perspective:

- The net positive impacts associated with the development and operation of the proposed Project are expected to outweigh the net negative effects. The Project is also envisaged to have a positive stimulus on the local economy and employment creation, leading to the economy's diversification and a small reduction in the unemployment rate. The Project should therefore be considered for development. It should, however, be acknowledged that the negative impacts would be largely borne by the nearby farms and households residing on them, whilst the positive impacts will be distributed throughout both the local and national economies. Due to this imbalance, it is recommended that the mitigation measures suggested be strictly adhered to. Application of these mitigation measures will ensure that the negative impacts on the nearby farms and businesses are minimised and that the distribution of the potential benefits of the project are more balanced.

Appendix A: Impact Methodology

In terms of **Appendix 6 of 2014 EIA Regulations**, as amended;

- » A specialist report prepared in terms of these Regulations must contain—
 - details of—
 - (i) the specialist who prepared the report; and
 - (ii) 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—
 - (i) as to whether the proposed activity or portions thereof should be authorised; and
 - (ii) 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.

Assessment of Impacts:

Direct, indirect and cumulative impacts associated with the projects must be assessed in terms of the following criteria:

- » The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- » The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- » The **duration**, wherein it will be indicated whether:
 - * the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
 - * the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
 - * medium-term (5–15 years) – assigned a score of 3;
 - * long term (> 15 years) - assigned a score of 4; or
 - * permanent - assigned a score of 5;
- » The **magnitude**, quantified on a scale from 0-10, where 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- » The **probability of occurrence**, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1–5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
- » the **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
- » the **status**, which will be described as either positive, negative or neutral.
- » the degree to which the impact can be reversed.
- » the degree to which the impact may cause irreplaceable loss of resources.
- » the *degree* to which the impact can be *mitigated*.

The **significance** is calculated by combining the criteria in the following formula:

$$S=(E+D+M)P$$

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The **significance weightings** for each potential impact are as follows:

- » < 30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
- » 30-60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- » > 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

Appendix B: Landowners Survey

Landowners/ Applicable Properties	Responded	Comments
NICJAC PIETERSE BOERDERY CC	NO	N/A
ROOIBLOM BOERDERY NO 1 TRUST	NO	N/A
PIETER FRANCOIS ERASMUS - PIETMAN	YES	None
JOHAN A LOMBARD	YES	None
ROUX FRANCAINA JOHANNA4105020022086	YES	None
MARIUS CARINUS TRUST1259/98	YES	None
HENDRIKSPAN BOERDERY CC 200205330223	YES	None
KLIPFONTEIN BOERDERY TRUST 5771/1996	YES	None
WILD MELODY INV	YES	None
VENTER GERHARDUS	NO	N/A
MEZELDA BEKKERSRUST TRUST4239/87	YES	None
JACOBUS LOURENS VAN DER MERWE FAMILIE TRUST	YES	None
ANNE-MARIE ERASMUS	NO	N/A
SING FARMING PTY LTD	NO	N/A
BADENHORST ELIZABETH CATHARINA 'BETSI' ROELF'S MOM	NO	N/A
SWART CORNELIS JOHANNES	YES	Concern about security on farms (24 hours)
VENTER GERHARDUS	NO	N/A
MLANGENI FARMS CC	NO	N/A
GREYLING MICHEL DANIEL	NO	N/A
ZWARTS JAN HENDRIK BLACKIE	YES	None
HENNIE FOURIE TRUST	YES	None
GELUKSPLAATS BELEGGINGS TRUST	NO	N/A
DEUTRANS LANDBOU EIENDOMME CC 200903881523	YES	Does not see anything changing, operations should continue as normal. However, more information is needed on the amount of land lost.
FRIK HUMAN PLASE CC	NO	N/A
ROELF BADENHORST	YES	Supports the project as it will create jobs and beneficial for everyone.
L N HOFFMAN BELLEGGINGS PTY LTD	YES	Requests more information regarding noise of wind turbines, safety on farm and amount of land lost.
MEDAD INV PTY LTD	YES	None
DYK WILLEM ADRIAAN CHRISTIAAN VAN	YES	Believes that this is a great project for the community, region and environment.

9 BIBLIOGRAPHY

- Statistics South Africa . (2016). *Community Survey*. Retrieved September 12, 2018, from <http://cs2016.statssa.gov.za/>
- Adrian, T., & Natalucci, F. (2020). *COVID-19 Crisis Poses Threat to Financial Stability*. Retrieved June 24, 2021, from <https://blogs.imf.org/2020/04/14/covid-19-crisis-poses-threat-to-financial-stability/>
- Department of Economic Development. (2011). *The New Growth Path Framework*.
- Department of Economic Development, T. a. (2016). *Formulation of Provincial Spatial Economic Development Strategy, Corridor and Nodal Framework and Data Mapping*.
- Department of Energy. (2013). *Integrated Resource Plan for Electricity 2010-2030 Update Report*.
- Department of Energy. (2018). *Integrated Resource Plan for Electricity 2018 Update Report*.
- Department of Energy. (2019). *Integrated Resource Plan for Electricity 2010-2030 Update Report*.
- Department of Minerals and Energy. (1998). *White Paper on the Energy Policy of the Republic of South Africa*. Republic of South Africa.
- Department of Minerals and Energy. (2003). *White Paper on Renewable Energy* .
- Department of Trade and Industry. (2016). *Industrial Policy Action Plan 2016/17-2017/18*.
- Department of Trade and Industry. (2018). *Industrial Policy Action Plan 2017/18-2020-2022*.
- DNA Economics. (2016). *Draft Green Economy Sector Plan*. Middleburg: DNA Economics.
- Duvenage, A. (2020). *City Press*. Retrieved June 24, 2021, from <https://citypress.news24.com/Business/what-the-moodys-downgrade-means-for-sa-20200330>
- e-SEK. (2020). *Making sense of COVID-19's impact on South African businesses*. Retrieved June 25, 2021, from <https://www.itweb.co.za/content/wbrpOMgYbkEvDLZn>
- Gert Sibande District Municipality. (2021). *Amended IDP*.
- Goldberg, A. (2015). *The economic impact of load shedding: The case of South African retailers* Gordon Institute of Business Science - University of Pretoria. Pretoria: Gordon Institute of Business Science - University of Pretoria.
- Govan Mbeki Local Municipality. (2021). *Fourth Review of the Integrated Development Plan*.
- Govan Mbeki Municipality. (2014). *Local Economic Development Strategy*.
- International Institute for Sustainable Development. (2018). *Strategies for just energy transitions*. Manitoba: IISD.
- JG Afrika. (2021). *Proposed Hendrina Wind Energy Facility, Mpumalanga Transport Study*.
- Kovaleski, D. (2019). *Study shows high investor confidence in renewable energy*. Retrieved June 25, 2021, from <https://dailyenergyinsider.com/news/20058-study-shows-high-investor-confidence-in-renewable-energy/>

Lanz, J. (2020). *Agricultural pre-EIA Assessment for proposed Hendrina, Camden East I, and Camden East II wind energy facilities in Mpumalanga.*

Lanz, J. (2022). *Agricultural pre-EIA Assessment for proposed Hendrina, Camden East I, and Camden East II wind energy facilities in Mpumalanga.*

Lekwa Local Municipality. (2021). *Final Draft IDP.*

Maree, D. (2019). *Agribusiness South Africa.* Retrieved March 9, 2022, from <https://www.bizcommunity.com/Article/196/741/188061.html>

McSweeney, R., & Timperley, J. (2018). *The Carbon Brief Profile.* Retrieved June 24, 2021, from <https://www.carbonbrief.org/the-carbon-brief-profile-south-africa>

Mpumalanga Economic Growth & Development Path. (2011). *Mpumalanga Economic Growth & Development Path.* MEGA.

Mpumalanga Nature Conservation Act 10 of 1998. (1999). *Centre for Environmental Rights.* Retrieved June 15, 2021, from <https://cer.org.za/virtual-library/legislation/provincial/mpumalanga/mpumalanga-nature-conservation-act-10-of-1998>

Mpumalanga Tourism and Park Agency. (2011). *MTPA Strategic Plan.* Nelspruit: MTPA.

Msukaligwa Local Municipality. (2021). *IDP.*

National Department of Energy (DOE). (2019). *The South African Energy Sector Report.* Pretoria: Department of Energy.

National Planning Commission. (2011). *The National Development Plan, Vision for 2030.*

NERSA. (2020). *National Electricity Industry Regulation: A different focus on the electricity supply industry challenges and possible solutions.* Pretoria: National Energy Regulator of South Africa.

Nkangala District Municipality. (2019). *Draft Adjusted Intergrated Development Plan.*

NPC. (2012). *National Development Plan: Vision for 2030.*

Provincial Planning Commission. (2016). *2035 Provincial Growth and Development Plan, Building a Better Future Together.*

Rchards Bay IDZ SOC. (2016). *RBIDZ Annual Report 2015-2016.*

REN21. (2019). *The Renewables 2019 Global Status Report.* Retrieved June 24, 2021, from <http://www.ren21.net/gsr-2019/pages/foreword/foreword/>

REN21. (2021). *The Renewables 2021 Global Status Report.* Retrieved June 24, 2021, from https://www.ren21.net/wp-content/uploads/2019/05/GSR2021_Full_Report.pdf

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

SACCI. (2022). *Business Confidence Index.*

Santander. (2020). *South Africa: Foreign investment*. Retrieved June 24, 2021, from <https://santandertrade.com/en/portal/establish-overseas/south-africa/foreign-investment>

Sihlobo, W., & Kapuya, T. (2021). *Daily Maverick*. Retrieved March 9, 2022, from <https://www.dailymaverick.co.za/article/2021-11-08-rising-domestic-and-international-agricultural-input-costs-set-to-squeeze-both-farmers-and-consumers/>

Sinding, S. (2009, May 16). *Population, poverty and economic development*. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2781831/>

SiVEST. (2021). *Proposed Construction of the Hendrina Renewable Energy*.

SiVEST. (2022). *Proposed Construction of the Hendrina Renewable Energy*.

South African Government. (2011). *New Growth Path Framework*.

Statistics South Africa. (2011). *Census*. Pretoria: Statistics South Africa.

Statistics South Africa. (2016). *Provincial Profile KwaZulu Natal*. Pretoria: Statistics South Africa.

StatsSA. (2021). *Department of Statistics South Africa*. Retrieved March 15, 2022, from <http://www.statssa.gov.za/?p=14660>

Steve Tshwete Local Municipality. (2010). *Spatial Development Framework*.

Steve Tshwete Local Municipality. (2016). *Local Economic Development Strategy*.

Swart, P., & Goncalves, S. (2020). *Downgrade of South Africa's credit rating further into junk*. Retrieved June 23, 2021, from <https://www.cliffedekkerhofmeyr.com/en/news/publications/2020/finance/finance-alert-11-may-downgrade-of-south-africas-credit-rating-further-i>

Trade & Industry Policy Strategies. (2021). *Making sense of jobs in South Africa's just energy transition: Managing the impact of a coal transition on employment*. South Africa: TIPS.

uMhlathuze LM. (2016). *Final IDP Review 2016/17 "Last IDP Review for the Third IDP Generation"*.

uThungulu DM. (2015). *uThungulu Spatial Development Review*.

Uthungulu DM. (2015). *uThungulu District Municipality Growth and Development Plan*.

uThungulu DM. (2016). *Integrated Development Plan 2011/12- 2016/17 Final Review*.

van Wyk, C. (2020). *SA's "big bazooka" stimulus package explained*. Retrieved June 24, 2021, from https://www.investec.com/en_za/focus/economy/sas-big-bazooka-stimulus-package-explained.html

van Wyk, M. (2018). *SABC News*. Retrieved March 9, 2022, from <https://www.sabcnews.com/rise-in-fuel-price-to-negatively-affect-agricultural-sector/>

World Wildlife Fund. (2014). *Renewable Energy Vision 2030 South Africa, Climate Change and Energy, Technical Report*. WWF.