

ECONOMIC IMPACT ASSESSMENT FOR THE PROPOSED KHAUTA SOLAR PV CLUSTER, WELKOM, FREE STATE PROVINCE

Desktop Assessment

Draft Report

November 2021

Report prepared for:

Enviro Works



Report prepared by:

Urban-Econ Development Economists



Specialist Expertise:**Pierre van Jaarsveld**

Profession: Manager/Senior Development Economist

Experience: 14 years

Key Skills: Local Economic Development Planning, Economic Property Market Analysis and Socio-Economic and Economic Impact Assessments

Memberships: Economics Society of South Africa (ESSA) - 00116

Qualifications: B.TRP HONS (Town and Regional Planning)

Pierre van Jaarsveld completed his B.TRP Town and Regional Planning degree at the University of Pretoria, South Africa. His expertise lies in property market analysis, economic impact assessment, feasibility analysis, project management, and project implementation. He built up valuable experience in Local Economic Development, agricultural development, enterprise development and impact modelling.

He has managed projects for various property and economic studies, such as integrated housing projects and socio-economic impact assessment. He has also facilitated a number of urban and rural renewal and development projects focusing on job creation opportunities and broadening the local economic base through investment attraction in bankable projects. Pierre currently serves as manager of Urban-Econ in Mpumalanga and is responsible for the day-to-day operations of the office.

TABLE OF CONTENTS

| | |
|---|-----------|
| 1. INTRODUCTION..... | 1 |
| 1.1. Scope and Purpose of the Project..... | 1 |
| 1.2. Delineation of the Study Area | 1 |
| 2. SOCIO-ECONOMIC PROFILE OF THE STUDY AREA | 3 |
| 3. Economic Impact Assessment Approach | 4 |
| 3.1. Economic Impacts..... | 4 |
| 3.1.1 Temporal Nature of Impacts..... | 4 |
| 3.1.2 Types of Economic Impacts | 4 |
| 3.1.3 Economic Impacts Considered..... | 5 |
| 3.1.4 Preliminary Economic Impact Inputs..... | 6 |
| 3.1.5 Preliminary Economic Impact Results..... | 6 |
| 3.2. Transmission Line Options | 7 |
| 3.3. Summary of the Potential preliminary Economic Impacts | 8 |
| 3.3.1 Preliminary Construction Impacts | 8 |
| 3.3.2 Preliminary Operational Impacts..... | 9 |
| 4. Synopsis..... | 10 |

1. INTRODUCTION

WKN-Windcurrent is proposing the development of three 100MW Solar PV Energy Facilities, or Projects ("Projects") near Welkom in the Free State Province. It should also be noted that there are no Eskom grid lines with available capacity crossing the sites, and so a separate application for an overhead power-line grid connection of approximately 12km will be required. The client has expressed interest in possibly developing two smaller additional facilities, just to the south of the 3 x 100 MW facilities. The development of the two smaller facilities (19.9 MW) will depend on the available suitable space. The 2 x 19.9. MW facilities will also be connected to a new separate Eskom 44 kV power line. This report serves as a desktop assessment of the potential economic impacts of the projects.

1.1. SCOPE AND PURPOSE OF THE PROJECT

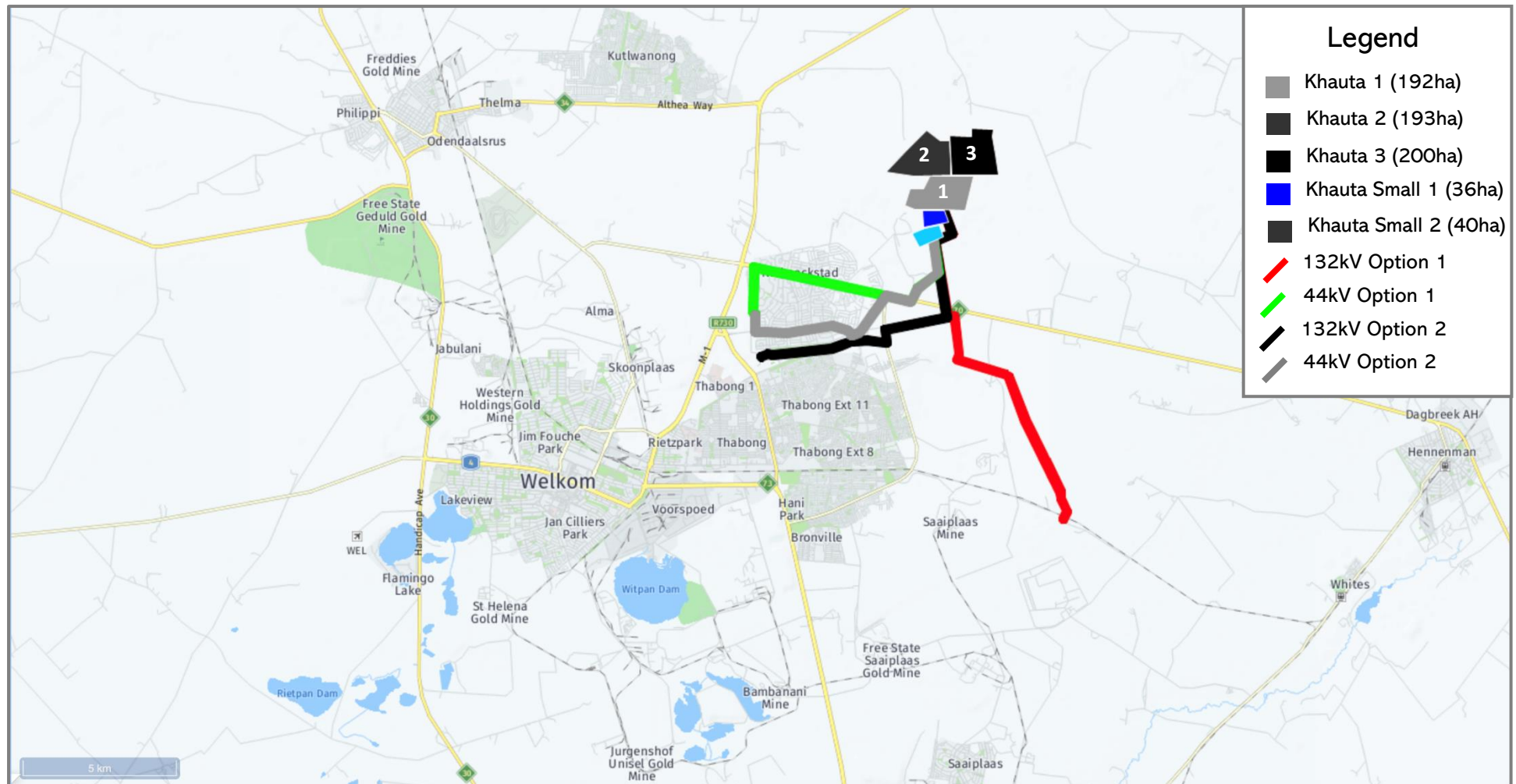
The Economic Impact Assessments will:

- Identify and assessment the economic impacts associated with:
 - the planning or policy development phase
 - the construction phase,
 - the operational phase and
 - 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.

1.2. DELINEATION OF THE STUDY AREA

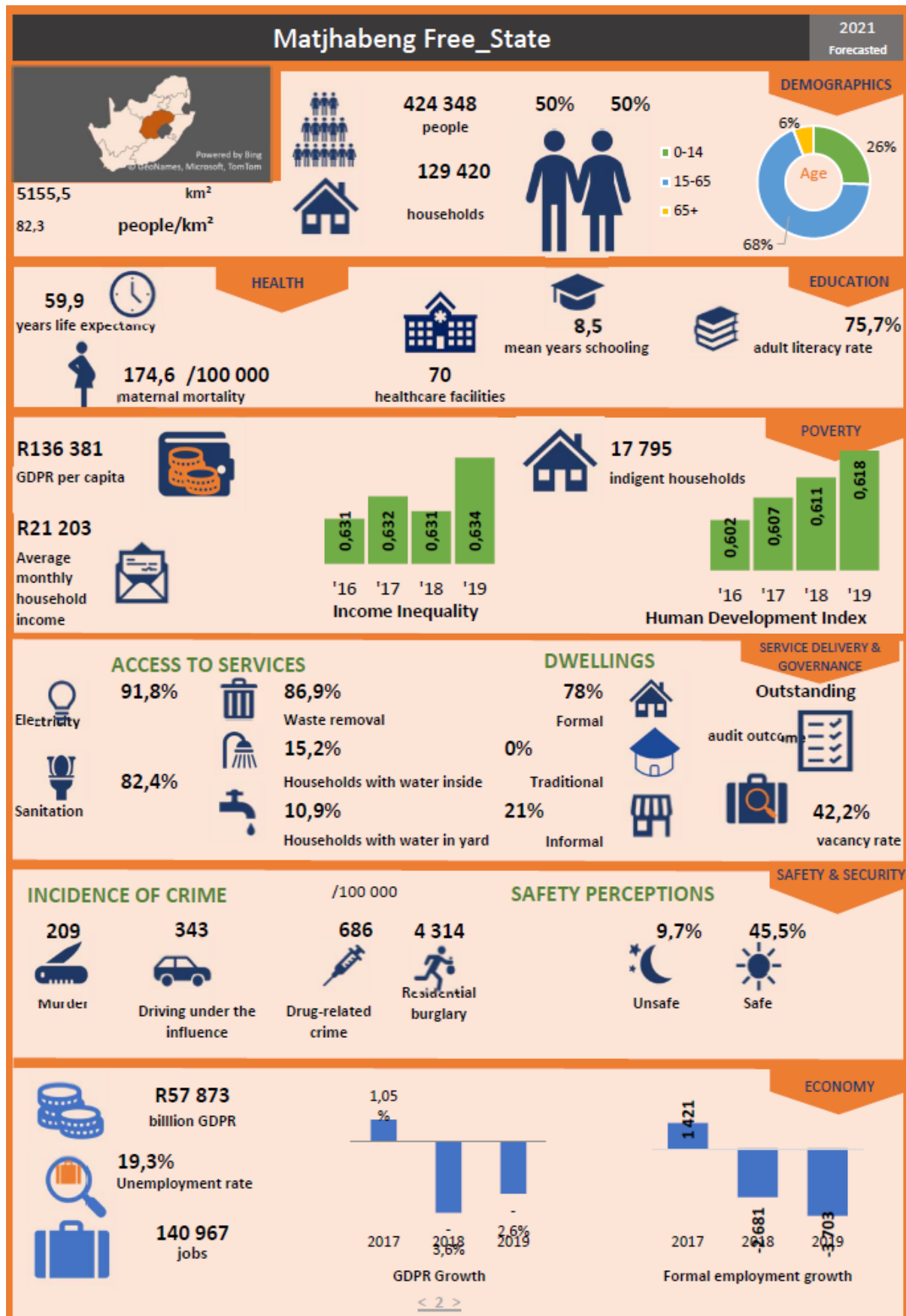
Study area delineation depends on the type of economic activity that is analysed and the perceived spread of economic impacts that are expected to be generated from the project during both the construction and operation phases. The municipal area where the site is located (Mathjabeng LM) is likely to 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.

Map 1: Khauta Solar PV Cluster Location and Layout



Source: Urban-Econ, 2021

2. SOCIO-ECONOMIC PROFILE OF THE STUDY AREA



Source: Urban-Econ calculations based on Statistics SA data, 2021

3. Economic Impact Assessment Approach

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

3.1. 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 in (i.e., opening, closing, expansion or contraction of a facility, project, or programme).

3.1.1 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.

3.1.2 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.

3.1.3 Economic Impacts Considered

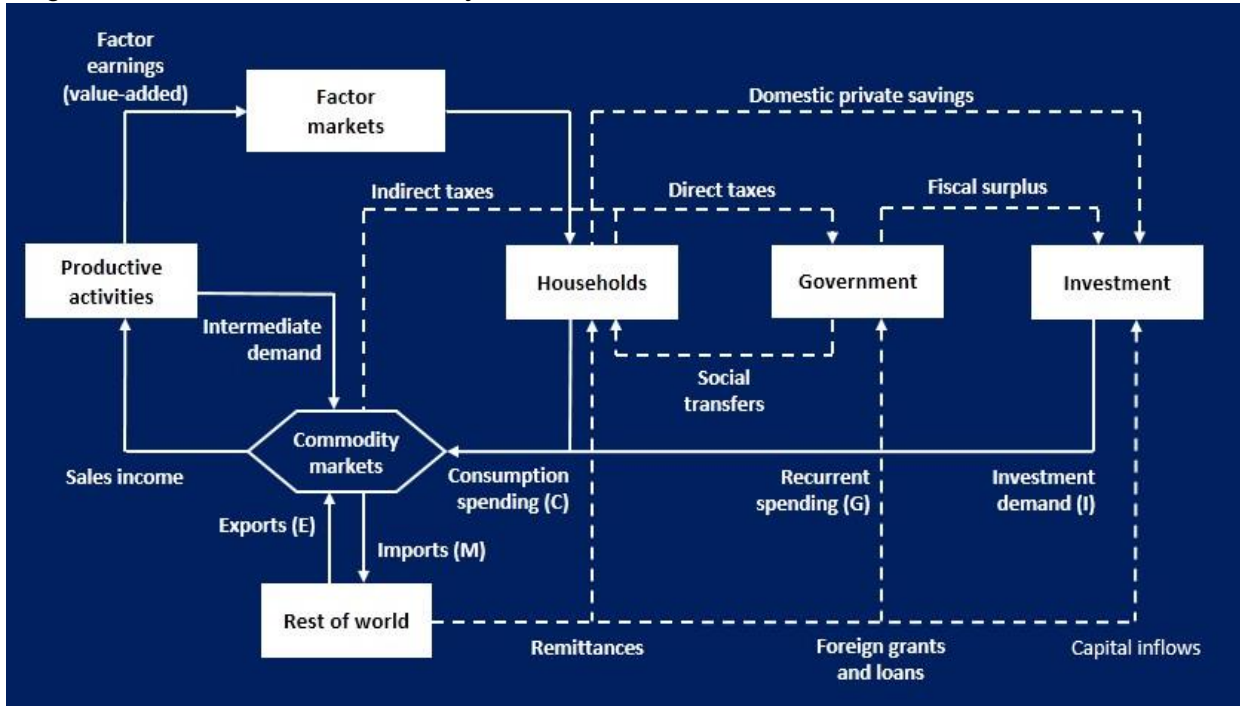
The direct and indirect economic impacts listed are measured according to the following broad economic variable categories:

- **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 wind farm

Using the Input/Output model methodology, various anticipated direct and indirect economic impacts of construction and operation phases of the proposed Khauta Solar PV complex 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).

The diagram below explains the circular flow of the economy, a Social Accounting Matrix (SAM) represents the flow of all economic transactions.

Diagram 1: Circular Flow of the Economy



Source: Urban-Econ, 2021

3.1.4 Preliminary Economic Impact Inputs

Based on the information received from the client, the following figures will be used to calculate the preliminary economic impacts.

Capital Expenditure (CAPEX) for Construction Phase

- 3 x 100MW = R3.0 billion
- 2 x 19.9MW = R480.0 million

Employment for Construction Phase

- 3 x 100MW = 10 000
- 2 x 19.9MW = 1 500

3.1.5 Preliminary Economic Impact Results

Based on the information received from the client, the following figures will be used to calculate the preliminary economic impacts. The preliminary impact result for the construction phase of the three 100MW solar PV facilities is illustrated in Table 3.1.

Table 3.1: Preliminary Impact for the Construction Phase (3x100MW Solar PV Facilities)

| IMPACT OF THE CAPEX | Direct | Indirect | Induced | Total Production |
|---------------------|----------------|----------------|----------------|------------------|
| PRODUCTION | R3 000 000 000 | R5 238 920 882 | R3 975 666 211 | R12 214 587 093 |
| GDP | R857 452 472 | R1 497 375 220 | R1 136 314 940 | R3 491 142 632 |
| INCOME | R409 028 367 | R714 289 085 | R542 053 420 | R1 665 370 872 |
| EMPLOYMENT | 4 176 | 7 293 | 5 535 | 17 004 |

Source: Urban-Econ Input/Output Modelling, 2021

The preliminary impact results for the construction phase of the two 19.9MW solar PV facilities are illustrated in Table 3.2.

Table 3.2: Preliminary Impact for the Construction Phase (2x19.9MW Solar PV Facilities)

| IMPACT OF THE CAPEX | Direct | Indirect | Induced | Total Production |
|---------------------|--------------|--------------|--------------|------------------|
| PRODUCTION | R480 000 000 | R838 227 341 | R636 106 594 | R1 954 333 935 |
| GDP | R137 192 396 | R239 580 035 | R181 810 390 | R558 582 821 |
| INCOME | R65 444 539 | R114 286 254 | R86 728 547 | R266 459 340 |
| EMPLOYMENT | 668 | 1 167 | 886 | 2 721 |

Source: Urban-Econ Input/Output Modelling, 2021

3.2. TRANSMISSION LINE OPTIONS

The project will have two 132kV line options for the 3 x 100MW Solar PV facilities as well as two 44kV line options for the 2 x 19.9MW Solar PV facilities. The options are discussed below:

- **132kV Line Option 1**

From an economic point of view this line option is approximately 2km longer than option 2, this line option also traverses more agricultural land than option 2. It is likely to be more expensive than option 2 and thus have a greater economic impact than option 2. However, the loss of potential agriculture needs to be weighed against the potential economic impact.

- **132kV Line Option 2**

This option is approximately 2km shorter than option 1 and traverses less agricultural land than option 1. The economic impact from option 2 will be less than option 1, however the potential negative impact on agricultural land will be less than option 1.

- **44kV Line Option 1**

This option is similar in length to option 2 and traverse similar areas via different routes. The economic impact for both options is likely to be very similar.

- **44kV Line Option 2**

This option is similar in length to option 1 and traverse similar areas via different routes. The economic impact for both options will be very similar. The deciding factor from an economic point of view will be the costing of the line options.

From an economic point of view all four of the line options are viable and the deciding factor will most likely be on the costing of the line options. From an economic perspective there are no red flags on any of the line options.

3.3. SUMMARY OF THE POTENTIAL PRELIMINARY ECONOMIC IMPACTS

The tables below illustrate the preliminary impacts during the construction phase and the operational phase.

3.3.1 Preliminary Construction Impacts

Table 3.3: Potential Preliminary Economic Impacts during Construction Phase (3x100MW)

| Impact | Status | Significance |
|---|----------|--------------|
| Impact on Production | Positive | High |
| Impact on GDP | Positive | Medium-High |
| Impact on Employment Creation | Positive | High |
| Skills Development | Positive | High |
| Household Income and Standard of Living | Positive | High |
| Impact on Agricultural Operation | Negative | Medium |

Table 3.4: Potential Preliminary Economic Impacts during Construction Phase (2x19.9MW)

| Impact | Status | Significance |
|---|----------|--------------|
| Impact on Production | Positive | Medium-High |
| Impact on GDP | Positive | Medium |
| Impact on Employment Creation | Positive | Medium-High |
| Skills Development | Positive | Medium-High |
| Household Income and Standard of Living | Positive | Medium-High |
| Impact on Agricultural Operation | Negative | Low |

Table 3.5: Potential Preliminary Economic Impacts during Construction Phase (132kV Line)

| Impact | Status | Significance |
|-------------------------------|----------|--------------|
| Impact on Production | Positive | Medium |
| Impact on GDP | Positive | Medium |
| Impact on Employment Creation | Positive | Medium |
| Skills Development | Positive | Medium |

| | | |
|---|----------|--------|
| Household Income and Standard of Living | Positive | Medium |
| Impact on Agricultural Operation | Negative | Low |

Table 3.6: Potential Preliminary Economic Impacts during Construction Phase (44kV Line)

| Impact | Status | Significance |
|---|----------|--------------|
| Impact on Production | Positive | Medium |
| Impact on GDP | Positive | Medium |
| Impact on Employment Creation | Positive | Medium |
| Skills Development | Positive | Medium |
| Household Income and Standard of Living | Positive | Medium |
| Impact on Agricultural Operation | Negative | Low |

3.3.2 Preliminary Operational Impacts

Table 3.7: Potential Preliminary Economic Impacts during Operational Phase (3x100MW)

| Impact | Status | Significance |
|---|----------|--------------|
| Impact on Production | Positive | Medium-High |
| Impact on GDP | Positive | Medium |
| Impact on Employment Creation | Positive | Medium |
| Skills Development | Positive | Medium |
| Household Income and Standard of Living | Positive | Medium |
| Increased Government Revenue | Positive | High |
| Improvement in Energy Sector Generation | Positive | High |

Table 3.8: Potential Preliminary Economic Impacts during Operational Phase (2x19.9MW)

| Impact | Status | Significance |
|---|----------|--------------|
| Impact on Production | Positive | Medium |
| Impact on GDP | Positive | Medium |
| Impact on Employment Creation | Positive | Low |
| Skills Development | Positive | Medium |
| Household Income and Standard of Living | Positive | Medium |
| Increased Government Revenue | Positive | High |
| Improvement in Energy Sector Generation | Positive | High |

Table 3.9: Potential Preliminary Economic Impacts during Operational Phase (132kV Line)

| Impact | Status | Significance |
|---|----------|--------------|
| Impact on Production | Positive | Low |
| Impact on GDP | Positive | Low |
| Impact on Employment Creation | Positive | Low |
| Household Income and Standard of Living | Positive | Low |

| | | |
|---|----------|------|
| Improvement in Energy Sector Generation | Positive | High |
|---|----------|------|

Table 3.10: Potential Preliminary Economic Impacts during Operational Phase (44kV Line)

| Impact | Status | Significance |
|---|----------|--------------|
| Impact on Production | Positive | Low |
| Impact on GDP | Positive | Low |
| Impact on Employment Creation | Positive | Low |
| Household Income and Standard of Living | Positive | Low |
| Improvement in Energy Sector Generation | Positive | High |

4. Synopsis

From an *economic perspective the projects will have overwhelming positive impact on the economy and job creation*. The only negative impact will be the potential loss of agricultural land, which have to be weighed against the positive impact of the proposed solar PV cluster.

Red Flags

- From an economic perspective there are no red flags for the proposed development, both the 3x100MW and the 2x19.9MW.
- There are also no red flags with regards to the line options for the 132kV or the 44kV lines.

Preferred 132kV Line Option

- From an economic perspective the preferred line option for the 132kV line is **Option 2** as it is shorter and will have less of a negative impact on the potential loss of agriculture and/or negative impact on agricultural activities.

Preferred 44kV line Option

- From an economic perspective both options will have a similar impact, the preferred option will be **Option 1** as it is a more direct route.

The project will help diversify the national energy grid and assist in improving energy generation in the region. The project will have a significant impact on the economy and has the potential for significant job creation, especially during the construction phase of the project.