SiVEST SA (PTY) LTD

Bonsmara Solar PV (RF) (Pty) Ltd

Environmental Impact Assessment

DEA Reference: *(or applicable)*
Report Prepared by: Thandiwe Chidzungu
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Executive summary

SiVEST (Pty) Ltd commissioned Synergy Global Consulting (Pty) Ltd to assess the environmental and social impacts of the Bonsmara Solar PV Energy Facility (SEF). Bonsmara Solar PV (RF) (Pty) Ltd proposes to build the 100 MW Bonsmara SEF and related grid connection infrastructure, including the Battery Energy Storage Systems (BESS) near Kroonstad in South Africa's Free State Province. The proposed SEF will be connected to the grid via a 2 km 132 kV powerline from the on-site substation to the Kroonstad switching station.

The assessment of impacts in this phase entails an analysis of the legal and policy frameworks at national, provincial and local levels applicable to this project. The report also provides a preliminary assessment of environmental issues associated with the construction, operational, and decommissioning phases of the project. The findings of the legal and policy review indicate that renewable energy aligns with the development agenda at national, provincial, and local levels.

The proposed development during the operational stage will improve financial security for farming operations indirectly through visible policing within the facility which will indirectly provide security against stock theft and other crimes. The PV panels can co-exist with agricultural production. The location of the solar PV facility near cultural heritage sites could be disruptive to those visiting these sites. At the decommissioning phase, the facility could pose challenges in terms of recycling and disposing of the solar panels and the scarification of the land. It has positive cumulative impacts, which include reduced air pollution, thereby making a positive contribution to climate change mitigation. However, there are several substations and powerlines in the region, already affecting the visual quality and sense of place in this modified rural landscape. The Bonsmara PV Facility and other proposed facilities listed above have a combined footprint of approximately ~4 705 ha; although large, the facilities are far apart and do not constitute a spatially concentrated, high density network of PV facilities, which mitigates cumulative impacts.

For a social perspective, it will create skilled and unskilled jobs during the construction and operational phases. While skilled employment will be open to experts from across the country, unskilled labour may be mostly reserved for local people. Skills transfer may also be one of the positive impacts of the project on local people. Positive outcomes have a moderate to high impact significance.
This report is compiled in-line with the National Environmental Management Act (NEMA) (Act No. 107 of 1998, as amended) and the EIA Regulations, 2014 (as amended).

NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) AND ENVIRONMENTAL IMPACT REGULATIONS, 2014 (AS AMENDED) - REQUIREMENTS FOR SPECIALIST REPORTS (APPENDIX 6)

Regulation GNR 326 of 4 December 2014, as amended on 7 April 2017, Appendix 6	**Section of the Report**
1. (1) A specialist report prepared in terms of these regulations must contain- a) details of- i. the specialist who prepared the report; and ii. the specialist's expertise to compile a specialist report, including a curriculum vitae;	Section 1
b) a declaration that the specialist is independent in a form that may be specified by the competent authority;	Specialist Declaration of Interest
c) an indication of the scope of and the purpose for which the report was prepared;	Section **Error! Reference source not found.**
(cA) an indication of the quality and age of the baseline data used for the specialist report;	Section **Error! Reference source not found.**
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development, and levels of acceptable change;	Section **Error! Reference source not found.**
d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section **Error! Reference source not found.**
e) a description of the methodology adopted in preparing the report or carrying out the specialised process, inclusive of the equipment and modelling used;	Section **Error! Reference source not found.**
f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying a site alternative;	Section **Error! Reference source not found.** Section **Error! Reference source not found.**
g) an identification of any areas to be avoided, including buffers;	N/A
h) 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;	N/A
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section **Error! Reference source not found.**
j) a description of the findings and potential implications of such findings on the impact of the proposed activity, (including identified alternatives on the environment) or activities;	Section **Error! Reference source not found.**
k) any mitigation measures for inclusion in the EMPr;	Appendix A
l) any conditions for inclusion in the environmental authorisation;	Section **Error! Reference source not found.**
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Appendix A

n) a reasoned opinion- i. (As to) whether the proposed activity, activities or portions thereof should be authorised. (iA) regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities, 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;	Section **Error! Reference source not found.**
o) a description of any consultation process that was undertaken during the preparation of the specialist report;	Section **Error! Reference source not found.**
p) a summary and copies of any comments received during any consultation process and, where applicable, all responses thereto; and	N/A
q) any other information requested by the competent authority.	N/A
2) Where a government notice *gazetted* by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such a notice will apply.	N/A

APPLICABILITY OF NEMA EIA REGULATIONS, 2014 (AS AMENDED IN 2017)
The following activities are applied for:

Activity No(s):	Relevant Basic Assessment Activity(is) as set out in Listing Notices 1 of the EIA Regulations, 2014 as amended
11(i)	**GN R. 327 (as amended) Item 11:** The development of facilities or infrastructure for the transmission and distribution of electricity— (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.
12(ii) (a) (c)	**GN R. 327 (as amended) Item 12:** The development of: ii) infrastructure or structures with a physical footprint of 100 square metres or more. where such development occurs- (a) within a watercourse. (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.
14	**GN R. 327 (as amended) Item 14:** The development of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres
19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;
24 (ii)	**GN R. 327 (as amended) Item 24**: The development of a road - ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres.

28 (ii)	**GN R. 327 (as amended) Item 28:** Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;
48 (i) (a) (c)	**GN R. 327 (as amended) Item 48:** The expansion of- (i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more. where such expansion occurs— (a) within a watercourse; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse:
56 (ii)	**GN R. 327 Item 56:** The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre - (i) where the existing reserve is wider than 13,5 metres: or (ii) where no reserve exists, where the existing road is wider than 8 metres
Activity No (s) :	**Relevant Scoping and EIA Activity(ies) as set out in Listing Notices 2 of the EIA Regulations, 2014 as amended**
1	**GN R. 325 (as amended) Item 1:** The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more.
15	**GN R. 325 (as amended) Item 15:** The clearance of an area of 20 hectares or more of indigenous vegetation.
Activity No (s):	**Relevant Basic Assessment Activity(ies) as set out in Listing Notice 3 of the EIA Regulations, 2014 as amended**
4 b. i (bb) (gg)	**GN R. 324 (as amended) Item 4:** The development of a road wider than 4m with a reserve less than 13.5 metres. **b. Free State** i. Outside Urban Areas: (bb) National Protected Area Expansion Strategy Focus areas. (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas
10 b. i.(bb) (gg) (hh)	**GN R. 324 (as amended) Item 10: T**he development and **related** operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres. **b. Free State** i. Outside Urban Areas: (bb) National Protected Area Expansion Strategy Focus areas. (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas (hh) Areas within a watercourse or wetland; or within 100m from the edge of a watercourse or wetland.
12 (b) (iv)	**GN R. 324 (as amended) Item 12:** The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. b. Free State iv. Areas within a watercourse or wetland; or within 100 meters from the edge of a watercourse or wetland
	GN R. 324 (as amended) Item 14: The development of—

14 ii. (a) (c) b (i) (bb) (ff) (hh)	(ii) infrastructure or structures with a physical footprint of 10 square metres or more. where such development occurs— (a) within a watercourse; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. **b. Free State** i. Outside urban areas: (bb) National Protected Area Expansion Strategy Focus areas. (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. (hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas
18 b (i) (bb) (gg) (hh)	**GN R. 324 (as amended) Item 18:** The widening of a road by more than 4 meters, or the lengthening of a road by more than 1 kilometre **b. Free State** i. Outside urban areas: (bb) National Protected Area Expansion Strategy Focus areas(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas (hh) Areas within a watercourse or wetland; or within 100m from the edge of a watercourse or wetland.
23 ii. (a) (c) b (i) (bb) (gg	**GN R. 3245 (as amended) Item 23:** The expansion of— (ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more. where such expansion occurs— (a) within a watercourse. (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse. excluding the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. **b. Free State** i. Outside urban areas: (bb) National Protected Area Expansion Strategy Focus areas. (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas.

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

Bonsmara Solar PV Facility, Free State Province

Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.environment.gov.za/documents/forms.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

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473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

1. SPECIALIST INFORMATION

Specialist Company Name:	Synergy Global Consulting			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	100%	Percentage Procurement recognition	
Specialist name:	Thandiwe Chidzungu			
Specialist Qualifications:	MSc in Geography and Environmental Studies			
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2. DECLARATION BY THE SPECIALIST

I, Thandiwe Chidzungu_____, declare that –

- I act as the independent specialist in this application.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant.
- I declare that there are no circumstances that may compromise my objectivity in performing such work.
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity.
- I will comply with the Act, Regulations and all other applicable legislation.
- I have no, and will not engage in, conflicting interests in the undertaking of the activity.
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority.
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist

Synergy Global Consulting

Name of Company:

13 February 2023

Date:

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, ___Thandiwe Chidzungu_____, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

Synergy Global Ltd

Name of Company

13 February 2023

Date

Signature of the Commissioner of Oaths

Date

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List of Abbreviations

B-BBEE	Broad-Based Black Economic Empowerment
BESS	Battery Energy Storage Systems
DETEA	Department of Economic Development, Tourism and Environmental Affairs
DFFE	Department of Forestry Fisheries and the Environment
DM	District Municipality
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
EMPr	Environmental Management Programme
GNR	Government Notice
IDP	Integrated Development Plan
IEP	Integrated Energy Plan
IRP	Integrated Resource Plan
kV	Kilovolt
LED	Local Economic Development
LM	Local Municipality
NEMA	National Environmental Management Act (No. 107 of 1998)
NDP	National Development Plan
NSDP	National Spatial Development Perspective
NFEPA	National Freshwater Ecosystem Priority Area
PGDS	Provincial Growth and Development Strategy
PICC	Presidential Infrastructure Coordinating Committee
PSDF	Provincial Spatial Development Framework
SDF	Spatial Development Framework
SEF	Solar Energy Facility
SIA	Social Impact Assessment
SIP	Strategic Infrastructure Project
STATSSA	Statistics South Africa

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1 INTRODUCTION

Bonsmara Solar PV (RF) (Pty) Ltd is proposing to construct the 100 MW Bonsmara Solar PV Energy Facility (SEF), Battery Energy Storage Systems (BESS), and associated grid connection infrastructure. This facility is planned to be located on a site approximately 12 km south-east of Kroonstad, in the Moqhaka Local Municipality (LM), in the Free State Province (Figure 1-1). Synergy Global Consulting (Synergy) was appointed to support SiVEST (Pty) Ltd to assess impacts associated with the development of the Bonsmara SEF and related infrastructure. The proposed SEF will connect to the grid through a 2km 132kv powerline from the on-site substation to the Kroonstad Switching Station.

Figure 1-1:Regional Context

Source: https://municipalities.co.za/provinces/view/2/free-stat

1.1 Scope and Objectives

The report is premised on the following objectives:

- To prepare the EIA for the Bonsmara SEF and associated grid connection.

1.2 Terms of Reference

The proposed Bonsmara SEF near the town of Kroonstad is subject to full EIA processes in terms of the National Environmental Management Act (NEMA) (Act No. 107 of 1998, as amended) and the EIA Regulations, 2014 (as amended).

1.3 Specialist Credentials

This report was written by Thandiwe Chidzungu of Synergy Global Consulting. Thandiwe Chidzungu is a social impact practitioner and has been doing research in mining communities in Mpumalanga, South Africa, for the past four years. She is currently working as a research consultant within the coal mining space, focused on South Africa's Just Energy Transition and the socio-economic impacts thereof on workers and communities. Her core professional skills include socio-economic analysis, academic research, presentations, and community engagement.

1.4 Assessment Methodology

1.4.1 Purpose of the study

The purpose of this environmental impact assessment process is to outline potential environmental impacts and the areas in which a full EIA is required for the Bonsmara SEF. An EIA is defined as the process of predicting and evaluating the environmental hazards of a proposed project or development scheme, taking into account co-related socioeconomic factors, cultural factors, and human activity impacts, both beneficial and adverse effects (Mahajan, 2023). It thus focuses on the biophysical environment and associated socio-cultural impacts:

- The environment: the quality of the air and water people use; the availability and quality of the food they eat; the level of hazards or risks they are exposed to; the amount of dust and noise they are exposed to; the adequacy of sanitation; their physical safety; and their access to and control over resources.
- Health and wellbeing: a state of complete physical, mental, social, and spiritual wellbeing in addition to the absence of disease or infirmity.
- Personal and property rights: civil liberties, including the ability to participate in the economy, social and political spaces, access to resources, and the ability to acquire and/or accumulate assets.
- Culture: shared beliefs, customs, values, and language or dialect.

This EIA process focuses on the following:

- Identifies baseline information describing the natural environment within which the project is proposed, and which may be impacted (both positively and negatively) by the proposed development.
- Identifies and describes possible environmental risks, fatal flaws, and biophysical impacts that may arise because of the proposed development (in terms of the detailed design and construction, operation, and decommissioning phases of the project).
- The EIA process is critical for determining which potential impacts are related to assessing (based on legislative requirements, international conventions, expert knowledge, and public involvement), how to compensate for adverse impacts on biodiversity (including the option of not proceeding with the development, finding alternative designs or sites that avoid the impacts, compensating for adverse and hazardous impacts, and finally eliminating the terms of reference) for the impact assessment (Mahajan, 2023).

1.4.2 Collation and review of existing information

Existing desktop information relevant to the project and context was reviewed and included the following:

- Project maps
- Google Earth imagery
- A description of the project as provided by the project proponent
- Census Data (2011)
- Local Government Handbook (2020)
- Planning documentation such as Provincial Growth and Development Strategies (PGDSs), Climate Change Response Strategy, local and district municipality Integrated Development Plans (IDPs), spatial development frameworks (SDFs), and development goals and objectives
- Relevant legislation, guidelines, policies, plans, and frameworks
- Available literature pertaining to environmental issues associated with the development and operation of solar energy facilities and associated infrastructure.

Stakeholder Identification and Analysis

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

The stakeholders that were engaged in the study were landowners (farmers), the municipality, parastatals (Eskom and Telkom) and different government officials refer to **Error! Reference source not found.**.

Table 1-1: Engagements with Stakeholders

			Consolidated key themes			
Stakeholder	**Date of survey administration**	**Method of engagement**	**Awareness of the proposed Development**	**Social Impacts**	**Environmental Impacts**	**Summary of issues**
Contractor for Openserve	16.01.2023 to 28.02.2023	Survey Questionnaire	Yes	New investments	None	They are aware of the proposed SEF development and believe that it will bring new investments. It will not have any environmental impacts
National Department of Agriculture, Land Reform, and Rural	16.01-2023 to 28.02.2023	Survey Questionnaire	Expected	New investments Loss of agricultural land	-	The development is/was expected considering the Eskom load shedding problems. The SEF will bring investments . However, it will take away agricultural land contributing to food insecurity.
Transnet SOC LTD	16.01-2023 to 28.02.2023	Survey Questionnaire	No	New investments Energy stability Economic growth	Loss of arable land	They are not aware of the proposed SEF development. However, they believe it will bring new investments, energy stability and hence economic growth. Nevertheless, there will be loss of arable land.
DFFE	16.01-2023 to 28.02.2023	Survey Questionnaire	No	Job creation	Ecosystem disturbance	They are not aware of the proposed SEF development. They however believe it will create jobs, pose ecosystem disturbance.
Municipality	16.01-2023 to 28.02.2023	Survey Questionnaire	Yes	Job creation Improve local economic development	Threat to biodiversity	They are aware of the proposed SEF development. They think that it will create jobs, improve local economic development. However, it will pose a threat to biodiversity through the loss of birds and bats linked to land clearing.

Landowners		Survey Questionnaire	Yes	Tenants' depended on subsistence farming hence their livelihoods will be affected. Loss of rental income from tenants. It will bridge the energy gap created by Eskom's load shedding.	Reduction of available pastures for cattle grazing.	The land was previously used for cattle rearing and there were some tenants of the property who depended on the land for subsistence farming. The development will reduce the available pastures for cattle grazing and this will repel tenant from renting the property. Nevertheless, due to the current shortage of electricity from Eskom, we see it as an opportunity for economic growth.

Impact assessment evaluation method

The rating system is used to assess the potential effects on the receiving environment and includes an unbiased assessment of feasible impact mitigation measures. A single rating has been created from all the impacts. The criteria, which include a point system, were applied to determine the importance of each issue; for further information, see Appendix B on pages 52-54.

2 ASSUMPTIONS AND LIMITATIONS

Most of the data which informed this report was collected from secondary sources. Data collection from primary sources is ongoing.

- Some of the data used to provide the baseline profile of the study area was derived from dated sources, such as the 2011 Census, the Free State Provincial Growth and Development Strategy (2007), the Free State Climate Change Response Strategy (2017), and the Moqhaka Local Municipality Integrated Development Plan (2017–2022).
- This SIA Report is intended to provide an overview of the current social environmental and assist in the identification of potential social impacts.
- This Report was prepared based on information which was available to the specialist at the time of preparing the report. The sources consulted are not exhaustive, and the possibility exists that additional information which might strengthen arguments, contradict information in this report, and / or identify additional information might exist.
- It is assumed that the motivation for, and planning and feasibility study of, the project were undertaken with integrity and that the information provided by the project proponent is accurate and true at the time of preparing this report.

3 TECHNICAL DESCRIPTION

3.1 Project Location

The planned 100 MW Bonsmara SEF and associated infrastructure will be constructed approximately 12 km south-east of Kroonstad in the Free State Province. The facility will be located on Portion 0 of Farm 636 and Portion 1 of Farm 636 (refer tables 3-1 and 3-2), located in the Moqhaka LM, in the Fezile Dabi District Municipality (DM). The facility will comprise several arrays of PV panels and associated infrastructure, including BESS, and have a contracted capacity of 100 MW. A 2 km 132 kV power line from the on-site substation to the Kroonstad switching station will connect the solar PV facility to the grid.

Table 3-1: Bonsmara Solar PV Facility Farm Details

Farm name	SG Code

Farm Scheveningen No. 636 Portion 0	F02000000000063600000
Farm Scheveningen No. 636 Portion 1	F02000000000063600001

Table 3-2: Grid Farm Details

Farm name	**SG Code**
Farm Oslaagte No. 2564 Portion 0	F02000000000256400000
Farm Scheveningen No. 636 Portion 1	F02000000000063600001

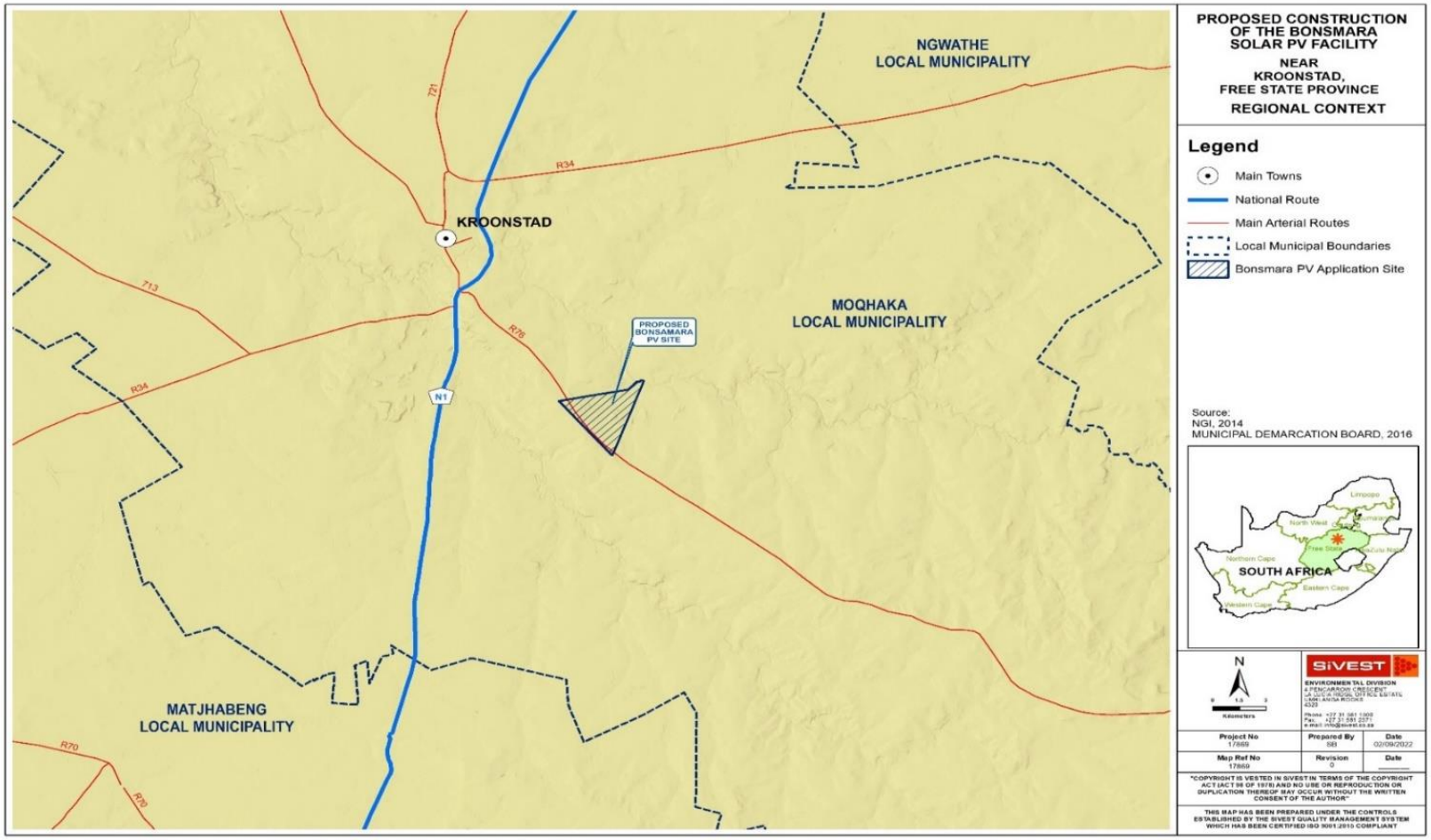

Figure 3-1: Locality map illustrating the location of the Kroonstad solar facility

3.2 Project Description

Solar Farm Components

Preliminary technical details of the respective solar farm are as follows.

- PV modules and mounting structures (monofacial or bifacial) with fixed, single, or double axis tracking mounting structures.
- Associated stormwater management infrastructure.
- Battery Energy Storage System (BESS)
- Site and internal access roads (up to 6 m wide)
- Auxiliary buildings (offices, parking, etc.)
- Ablution facilities and associated infrastructure
- Temporary laydown area during the construction phase for the construction camp and laydown area (which will become a permanent laydown area for the BESS during the operational phase).
- Infrastructure, including offices, an operational control centre, an operation and maintenance area, ablution facilities, etc.
- 33 kV/132 kV on-site substation (facility substation)
- Grid connection infrastructure, including medium-voltage cabling between the project components and the facility substation; underground cabling will be used where practical, up to 33 kV
- Perimeter fencing, and
- Rainwater and/or groundwater storage tanks and associated water transfer infrastructure.

Solar Facility Infrastructure

The proposed solar PV energy facility is expected to have PV fields (arrays) made up of many PV panels. As seen in Figure 3-1 below, solar PV panels are typically stacked in rows of many PV modules.

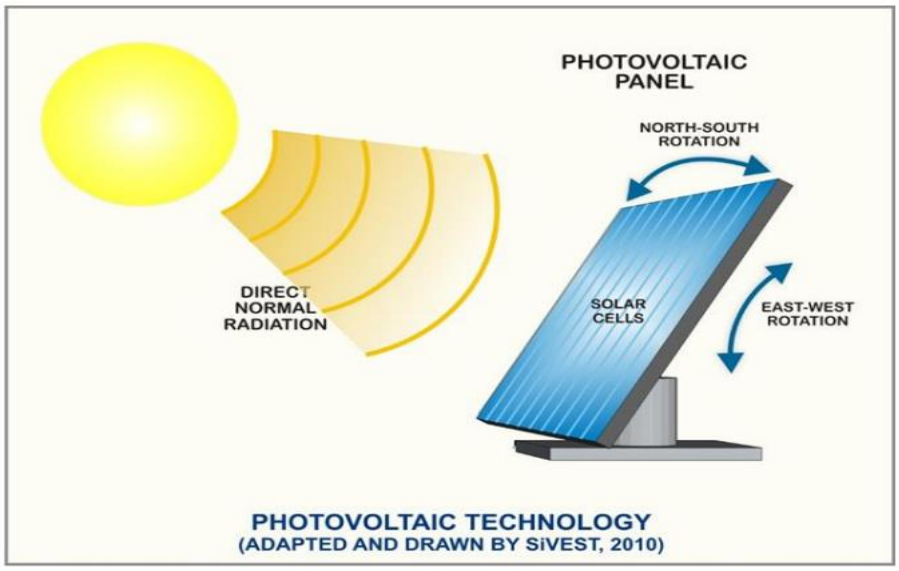

Figure 3-2: Typical Components of a Solar Panel

The solar arrays are usually connected in strings, which are in turn connected to inverters, where the DC power from the panels will be converted into AC power and the transformers will normally step up the voltage to a medium voltage. As previously noted, medium-voltage cabling will connect the solar PV energy facility to

the 132 kV overhead power line and 33 kV/132 kV on-site substation that serves as the grid connection infrastructure. Wherever physically possible, the facility's medium-voltage cables will be buried before being fed to the on-site or collector substation, where the voltage is normally increased. In Figure 3-3 below, the procedure for producing power using solar panels is shown.

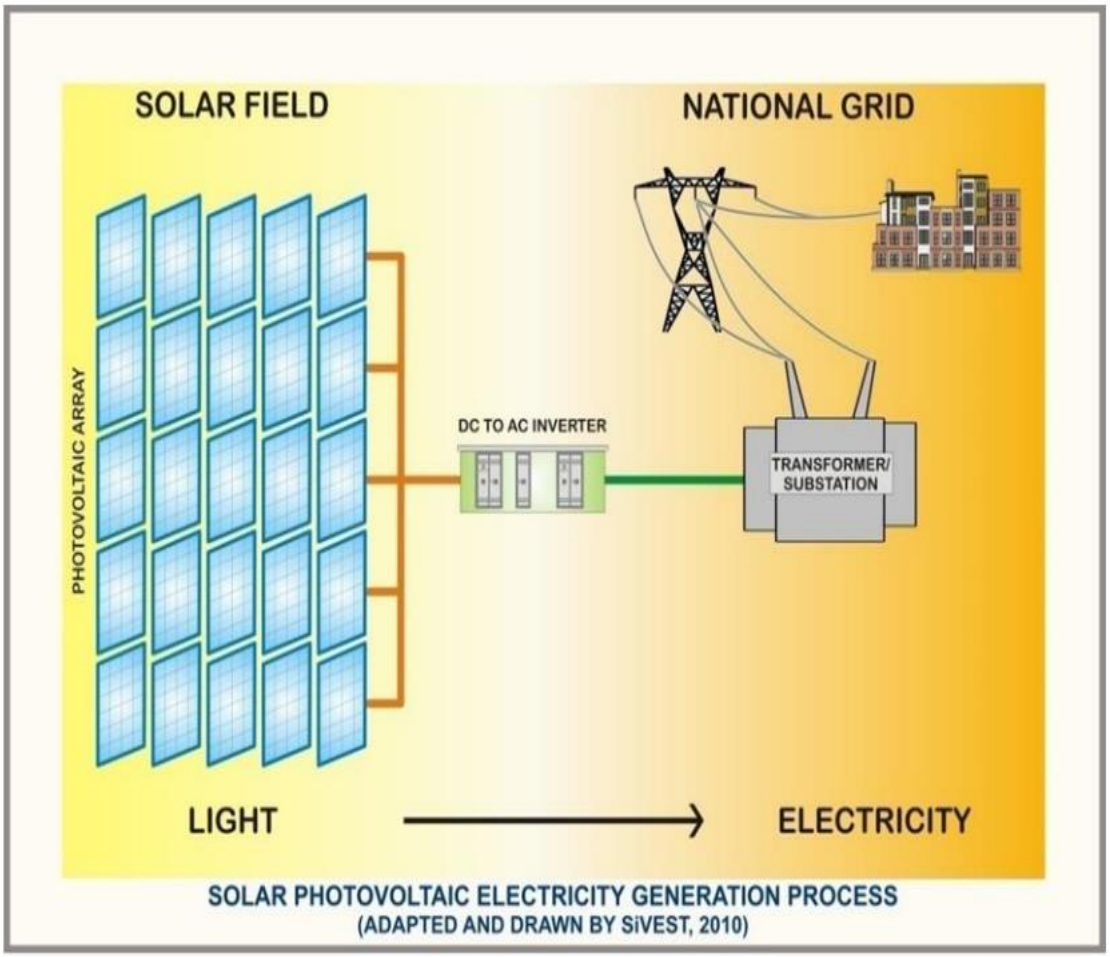

Figure 3-3: The solar PV electricity generation process

Roads

The regional tarmac R76, which is close to the site, serves as the primary entrance to the Bonsmara SEF. The solar PV panels will then need to be accessible via internal roads. The site and internal roadways will have a maximum width of ± 6 m and be made up of both new and renovated roads.

Battery energy-storage systems

It is proposed to incorporate a Battery Energy Storage System (BESS) into the Bonsmara SEF that is 2 ha in extent. On the land that will serve as the temporary construction laydown area throughout the construction phase, the BESS is proposed to be built. There are two BESS alternatives that are taken into account: electrolytes for solid state battery electrolytes (e.g., lithium-ion (Li-ion) zinc hybrid cathode, sodium ion, zinc bromine, sodium sulphur) and redox-flow technology.

3.2.1 Layout Alternatives

Location Alternatives

No other location alternatives are being considered. Many areas in South Africa are constrained in exporting capacity as per the Generation Connection Capacity Assessment of the 2024 Transmission Network (GCCA 2024). The site is located approximately 2 km from a grid connection point that has been confirmed to have sufficient capacity to evacuate the generation. The land has been confirmed as being available in the form of private landowners who have made the development possible.

Technology Alternatives

No technology alternatives are being considered. Concentrated Solar Power (CSP) technology would not be suitable for this site because it requires a flat surface, has a high visual impact, and requires large volumes of water. Furthermore, CSP is not addressed in the 2019 Integrated Resource Plan (IRP 2019). The climatic conditions show that the wind resource in the area is not suitable for a wind energy facility.

SEF Layout Alternatives

Design and layout alternatives will be considered and assessed as part of the EIA, taking into consideration the environmental constraints identified by the various specialists and the amended layout where necessary. In terms of the BESS, laydown areas, substations, etc., these are all optimally located in the south-east corner of the site, closest to the grid connection point and access roads. The power line takes the shortest route to the grid connection point, and a portion of it follows an existing 132kV power line.

4 LEGAL REQUIREMENTS AND GUIDELINES

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

The following documents were reviewed as part of this process:

National Policy and Planning Context:

- Constitution of the Republic of South Africa, 1996
- National Environmental Management Act (No. 107 of 1998) (NEMA)
- White Paper on the Energy Policy of the Republic of South Africa (1998)
- National Energy Act (No. 34 of 2008)
- Integrated Energy Plan (IEP) (2015)
- National Development Plan (NDP) 2030 (2012)
- Strategic Infrastructures (SIPs)
- Occupational Health and Safety Act (Act No. 85 of 1993) [OHSA].
- Environment Conservation Act (Act 73 of 1989) [ECA]
- Road Safety Act (Act No. 93 of 1996) [RSA].
- National Environmental Management: Air Quality Act (Act No. 39 of 2004) [NEM:AQA].
- National Environmental Management: Waste Act (Act No. 59 of 2008, as amended) [NEM;WA].
- Development Facilitation Act (Act No. 67 of 1995) [DFA].
- Promotion of Access to Information Act (Act No. 2 of 2000); [PAIA]
- The Hazardous Substances Act (Act No. 15 of 1973) [HSA].

- Water Services Act (Act No. 108 of 1998) [WSA].
- Municipal Systems Act (Act No. 32 of 2000) [MSA].
- Subdivision of Agricultural Land Act, 70 of 1970, and
- Mineral and Petroleum Resource Development Act (Act No. 28 of 2002, as amended) [MPRDA]

Provincial Policy and Planning Context:

- Free State Provincial Growth and Development Strategy (FSGDS) (2005 – 2014)
- Free State Provincial Growth and Development Strategy (FSGDS), Revised October 2007
- Free State Provincial Spatial Development Framework (PSDF): Executive Summary (Inception Report)
- Free State Climate Change Response Strategy (2017)
- Free State Green Economy Strategy (2014)
- Free State Investment Prospectus (2019) Free State Provincial Growth and Development Strategy (FSGDS) (2005 – 2014)
- Free State Investment Prospectus (2019)
- Integrated Development Plan (IDP) of the Moqhaka Local Municipality 2021/2022.

Local Policy and Planning Context:

- Integrated Development Plan (IDP) of the Fezile Dabi District Municipality 2016-2017
- Integrated Development Plan (IDP) of the Moqhaka Local Municipality 2022/2023-2026/2027

4.1 National Policy and Planning Context

Any project that contributes positively towards the objectives mentioned within national policies could be considered strategically important for the country. A brief review of the most relevant national legislation and policies is provided in Table 4-1 below.

Table 4-1: Relevant National Legislation and Policies for the Bonsmara Solar PV Facility

Relevant legislation or policy	Relevance to the proposed project
Constitution of the Republic of South Africa, 1996	Section 24 of the Constitution pertains specifically to the environment. It states that everyone has the right to an environment that is not harmful to their health or well-being, and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation, and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development. The Constitution outlines the need to promote social and economic development. Section 24 of the Constitution therefore requires that development be conducted in such a manner that it does not infringe on an individual's environmental rights, health, or well-being. This is especially significant for vulnerable communities, who are most at risk of environmental impacts.
National Environmental Management Act (No. 107 of 1998) (NEMA)	This legislation is South Africa's key piece of environmental legislation and sets the framework for environmental management in the country. Aligned with the constitution, NEMA is founded on the principle that everyone has the right to an environment that is not harmful to their health or well-being.

Relevant legislation or policy	Relevance to the proposed project
	The national environmental management principles state that the social, economic, and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed, and evaluated, and decisions must be made in light of such consideration and assessment. The need for responsible and informed decision-making by the government on the acceptability of environmental impacts is therefore enshrined in NEMA.
National Development Plan 2030 (2012)	The National Development Plan (NDP) 2030 is a plan prepared by the National Planning Commission in consultation with the South African public that is aimed at eliminating poverty and reducing inequality by 2030. In terms of the energy sector's role in empowering South Africa, the NDP envisages that, by 2030, South Africa will have an energy sector that promotes: • Economic growth and development through adequate investment in energy infrastructure. The sector should provide reliable and efficient energy service at competitive rates while supporting economic growth through job creation. • Social equity through expanded access to energy at affordable tariffs and through targeted, sustainable subsidies for needy households. • Environmental sustainability through efforts to reduce pollution and mitigate the effects of climate change. The NDP aims to provide a supportive environment for growth and development while promoting a more labour-absorbing economy.
White Paper on the Energy Policy of the Republic of South Africa (1998)	The White Paper on Energy Policy places emphasis on the expansion of energy supply options to enhance South Africa's energy security. This can be achieved through increased use of Renewable Energy (RE) and encouraging new entrants into the generation market. South Africa has an attractive range of cost-effective renewable resources, taking into consideration social and environmental costs. The government's policy on RE is thus concerned with meeting the following objectives: • Ensuring that economically feasible technologies and applications are implemented. • Ensuring that an equitable level of national resources is invested in renewable technologies, given their potential and compared to investments in other energy supply options. • Addressing constraints on the development of the renewable energy industry. The policy states that the advantages of renewable energy include minimal environmental impacts during operation in comparison with traditional supply technologies, generally lower running costs, and high labour intensities. Disadvantages include higher capital costs in some cases, lower energy densities, and lower levels of availability depending on specific conditions, especially with sun- and wind-based systems. Nonetheless, renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future. The White Paper on Energy Policy, therefore, supports the advancement of RE sources and ensuring energy security through the diversification of supply.
National Energy Act (No. 34 of 2008)	The purpose of the National Energy Act (No. 34 of 2008) is to ensure that diverse energy resources are available in sustainable quantities and at affordable prices to the South African economy in support of economic growth and poverty alleviation, while taking environmental management requirements into account. In addition, the Act also provides for energy planning, and increased generation and consumption of Renewable Energies (REs).

Relevant legislation or policy	Relevance to the proposed project
	The objectives of the Act are, among others, to: • Ensure uninterrupted supply of energy to the Republic. • Promote diversity of supply of energy and its sources. • Facilitate energy for the improvement of the quality of life of the people of the Republic. • Contribute to the sustainable development of South Africa's economy. Hence, the National Energy Act recognises the significant role that electricity plays in growing the economy while improving citizens' quality of life. The Act provides the legal framework that supports the development of RE facilities for the greater environmental and social good and provides the backdrop against which South Africa's strategic planning on future electricity provision and supply takes place.
Integrated Energy Plan (IEP) (2016)	The Integrated Energy Plan (IEP), which was developed under the National Energy Act (No. 34 of 2008) recognises that energy is essential to many human activities and is critical to the social and economic development of a country. The purpose of the IEP is to ensure the availability of energy resources and access to energy services in an affordable and sustainable manner while minimising associated adverse environmental impacts. Energy planning, therefore, needs to balance the need for continued economic growth with social needs and the need to protect the natural environment. The IEP is a multi-faceted, long-term energy framework that has multiple aims, including: • To guide the development of energy policies and, where relevant, set the framework for regulations in the energy sector. • To guide the selection of appropriate technologies to meet energy demand (i.e., the types and sizes of new power plants and refineries to be built and the prices that should be charged for fuels). • To guide investment in and the development of energy infrastructure in South Africa. • To propose alternative energy strategies which are informed by testing the potential impacts of various factors such as proposed policies, the introduction of new technologies, and the effects of exogenous macroeconomic factors.
Strategic Infrastructure Projects (SIPs)	The Presidential Infrastructure Coordinating Committee (PICC) are integrating and phasing investment plans across 18 Strategic Infrastructure Projects (SIPs), that have the following 5 core functions: • To unlock opportunity. • To transform the economic landscape. • To create new jobs. • To strengthen the delivery of basic services. • To support the integration of African economies. A balanced approach is being fostered through the greening of the economy, boosting energy security, promoting integrated municipal infrastructure investment, facilitating integrated urban development, accelerating skills development, investing in rural development, and enabling regional integration. SIP 8 of the energy SIPs supports the development of RE projects as follows: • SIP 8: Green energy in support of the South African economy: Support sustainable green energy initiatives on a national scale through a diverse range of clean energy options as envisaged in the Integrated Resource Plan (IRP) 2010, and support biofuel production facilities.

The development of the proposed project is, therefore, aligned with national legislation and policies, as it constitutes a clean energy initiative that would contribute to socio-economic development while avoiding adverse environmental impacts associated with high-carbon energy generation technologies.

4.2 Provincial Policies

This section provides a brief review of the most relevant provincial policies (refer Table 4-2). The proposed Bonsmara SEF and associated infrastructure are considered to align with the aims of these policies.

Table 4-2: Relevant Provincial Policies for the Bonsmara Solar PV Facility

Relevant policy	Relevance to the proposed project
Free State Provincial Growth and Development Strategy (FSGDS) (2005 – 2014)	The overarching– goal of the Free State Growth and Development Strategy (FSGDS) is to align provincial and national policies and programmes, and to guide development in terms of effective and efficient management and governance to achieve growth and development. The strategy is a living document that uses the latest business planning and evaluation tools in order to maximise the effect of all spending. Based on the social and economic development challenges of the province, the strategy identifies a few primary objectives, including stimulating economic development, developing and enhancing the infrastructure for economic growth and social development, alleviating poverty through human and social development, ensuring a safe and secure environment for all, and promoting effective and efficient governance and administration. The development of the energy and infrastructure sectors supports the overall objective of stimulating economic development and infrastructure investment towards growth and social development, by contributing to the energy mix, supply, and infrastructure of the province. The development of the facility will also contribute to the alleviation of poverty through the creation of direct and indirect employment opportunities.
Free State Provincial Spatial Development Framework (PSDF): Executive Summary (Inception Report)	The Free State PSDF is a provincial spatial and strategic planning policy that responds to and complies with, in particular, the National Development Plan Vision 2030 and the National Spatial Development Perspective (NSDP). The latter encourages all spheres of government to prepare spatial development plans and frameworks that promote a developmental state in accordance with the principles of global sustainability as is advocated, among others, by the South African Constitution and enabling legislation. The PSDF states that sustainable economic development is the only effective means by which the most significant challenge of the Free State, namely poverty, can be addressed. The proposed RE facility will contribute to the sustainable economic development objectives of the Free State PSDF, through the generation of clean energy and the creation of jobs and business opportunities.
Free State Green Economy Strategy (2014)	This green economy strategy for Free State Province (FSGES) was developed in alignment with the national green economy strategy elaborated in the National Green Economy Framework and Green Economy Accord, as well as the Free State Provincial Growth and Development Strategy. The objective was to develop a green economy strategy to assist the province to, inter alia, improve environmental quality and economic growth and to develop green industries and energy efficiency within the province.

Relevant policy	Relevance to the proposed project
	The proposed SEF development will contribute to the goal of energy efficiency and green industry while promoting economic growth and is therefore consistent with this strategy.
Free State Investment Prospectus (2019)	The prospectus states that opportunities are opening up in the province for the energy sector, including renewable energy. Rezoning for the development of multiple solar energy facilities has already been undertaken in the province. Considering future opportunities available for the development of renewable energy facilities (including solar PV facilities), the development of the Bonsmara SEF is considered to be in line with the investment prospectus of the province.

4.3 Municipal Policies

The strategic policies at the district and local municipality level have similar objectives for the respective areas, namely, to accelerate economic growth, create jobs, and uplift communities. The proposed Bonsmara SEF is considered to align with the aims of these policies. A brief review of the most relevant district and local municipal policies is provided in Table 4-3 below.

Table 4-3: Relevant District and Local Municipal Policies for the Bonsmara Solar PV Facility

Policy	Relevance to the proposed project
Integrated Development Plan (IDP) of the Fezile Dabi District Municipality 2016-2017	The vision of the municipality is to be a community-oriented entity characterised by sound political and administrative capacity and a sustainable and enabling business environment. With the main challenges within the municipal area being poverty and unemployment sitting at 46.03 percent (STATSSA 2011), this proposed project will contribute towards the creation of employment and some poverty reduction.
Integrated Development Plan (IDP) of the Moqhaka Local Municipality (2022-2027)	The need for sustainable, clean energy supply nationally is also applicable in Moqhaka. The Moqhaka LM IDP (2022-2027) notes that while 98% of households within the municipality have access to electricity, there is a need for the expansion of public lighting. The proposed SEF will contribute to the national grid, which, in turn, will increase the supply of electricity for communities across the country.

4.4 Conclusion

The review of relevant legislation, policies, and documentation pertaining to the proposed development indicates that the establishment of the solar farm and associated infrastructure is supported at the national, provincial, and local levels, and that the proposed project will contribute positively towards several targets and policy aims.

5 DESCRIPTION OF THE RECEIVING ENVIRONMENT

This chapter provides an overview of the physical and social environment of the province, district municipality (DM), and local municipality (LM) within which the proposed Bonsmara SEF is located.

Physical Environment

Moqhaka is bordered to the west by the Vaal River. The Vals and Renoster Rivers drain through the area towards the Vaal River. These rivers play a significant role in providing the raw water supply to Kroonstad, Steynsrus, and Viljoenskroon. The topography is remarkably uniform, with no prominent features, and the region is distinguished by very gentle slopes. There are many shallow, non-perennial pans in the western regions around Viljoenskroon**.**

Geohydrology and Geology

The Beaufort Group's sandstones, mudstones, and Ecca Group's shales form the foundation of the region surrounding Kroonstad. Around Kroonstad, a sizable dolerite sheet has also been delineated. Contrary to general expectations, the Ecca Group has been mapped as having "low development potential" as contrasted to the Beaufort Group's "very low development potential" in terms of the identification and development of sustainable water supply. It makes sense that the Beaufort Group's sediments would have had a larger potential for development. But there is a chance for increased groundwater yields on the dolerite sheet (Bertram, 2011; cited by Tempelhoff *et al.,* 2011).

The Vals River originates in the Drakensberg foothills, where it flows naturally westward until it reaches the small town of Lindley, when it is subjected to its first municipal exploitation and may be polluted by the presence of stormwater, effluent, and raw sewage. The Morgenzon farm in Steynsrus serves as the service provider for the town of Steynsrus, which draws water from the river on its route to Kroonstad. Farmers and a small number of tiny communities use the river farther downstream (Tempelhoff et al., 2011).

Land Use

Unimproved grassland makes up most of the catchment's land use (57.84%), followed by cultivated land without irrigation (40.46%). Only 0.68% of the watershed is made up of built-up and urban areas, such as Kroonstad and Steynsrus. Activities that have an impact on the river are human settlements and agriculture (Council of Scientific and Industrial Research [CSIR], 2003).

The social environment

The province, district municipality (DM), and local municipality (LM) within which the proposed Bonsmara SEF is located are shown in Table 5-1.

Table 5-1: The Administrative Geography of the Proposed Bonsmara SEF

Governance Level	Location
Province	Free State
District	Fezile Dabi DM
Local	Moqhaka LM
Nearest Town	Kroonstad

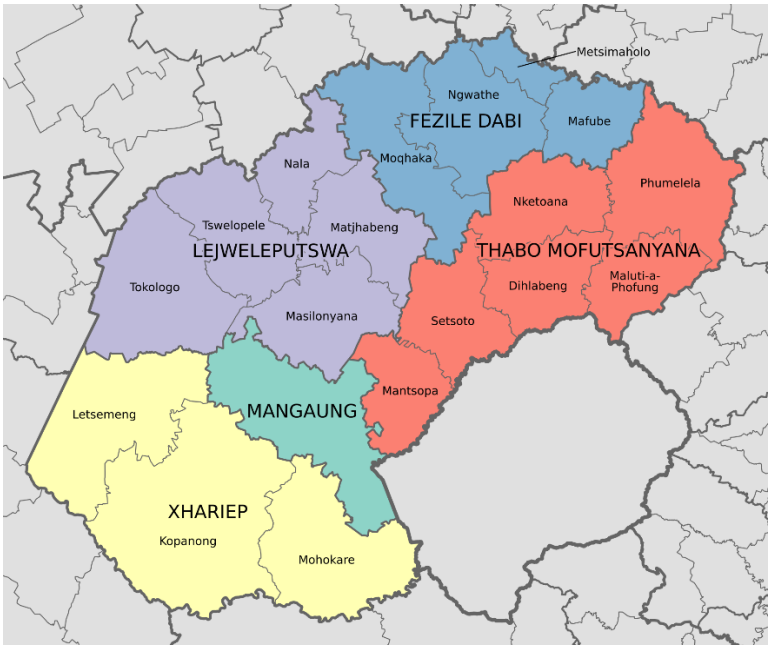

Figure 5-1: Map showing the districts and local municipalities of the Free State

Source: List of municipalities in the Free State. (2022, April 27). In Wikipedia. https://en.wikipedia.org/wiki/List_of_municipalities_in_the_Free_State

5.1 The Free State's Socio-Economic Environment

The Free State is one of the nine provinces of South Africa. It represents 10.6% of the total land area of the country, with a total area of 130 041.5 km^2, a population density of 21.8 people per km^2, and a population of 2,834,714 people.

Demography

Key demographic data is shown in Figure 5-2 below.

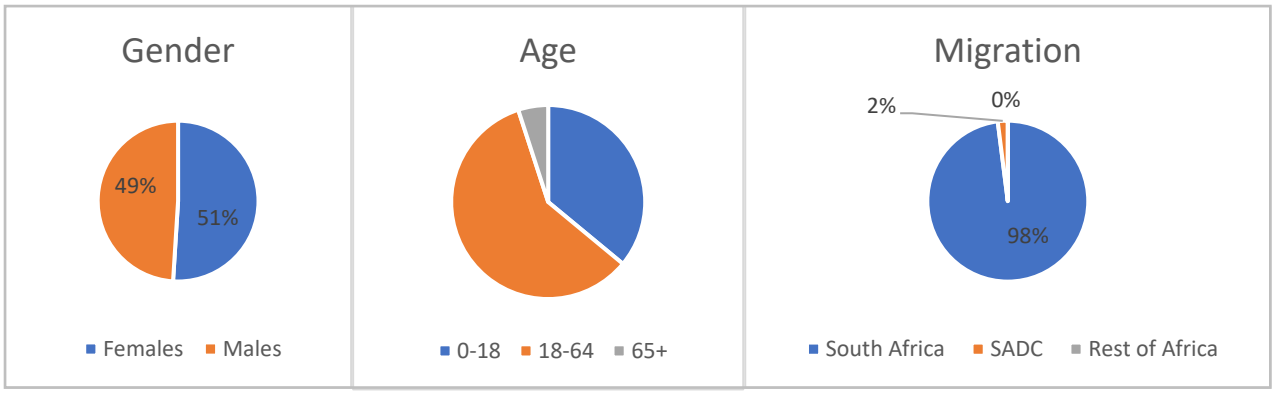

Figure 5-2 : Provincial Population by Gender, Age, and Migration

Source: https://wazimap.co.za/profiles/province-FS-free-state

According to the data provided in the 2016 Community Survey, there are more women than men. With women estimated at. There is a high percentage (59%) of the 18–64 age group, relative to other age cohorts, and the population is South African, with only 2% coming from the SADC countries (Statistics South Africa, 2016).

Socio-economic analysis

According to Statistics South Africa (2016), the educational levels in the Free State Province are low, with a 39.7 percent matriculation completion rate and 68.6 percent having completed Grade 9. The employment rate is 36%, with the rest of the population either unemployed (17%), discouraged job seekers (6%), or not economically employed (41%).

Access to basic services

An estimated 4.8% (134,750) of the population in the Free State has no access to electricity, lower than the national rate of 7.29%. Approximately 74% have access to flush toilets or chemical toilets, higher than the national rate (63.53%). On the other hand, 1.3% (36,831) have no access to any sanitation facilities in the province, which is about half the national rate of 2.39% (1,332,582). Water is provided to an estimated 94.2% (269,748) of the population by a regional or local service provider, which is approximately 10% higher than the rate in South Africa, at 86.2%. There are 946,637 formal households, less than 10% of South Africa's total of 16,923,307. An estimated 14% (132,448 households) live in informal dwellings (shacks), which is about 10% higher than the national rate of 12.96% (2,193,968) (Statistics South Africa, 2016).

5.2 Fezile Dabi District Municipality’s Socio-Economic Environment

As per the Local Government Municipal Structure Act 117 of 1998, the Fezile Dabi DM is a Category C municipality with municipal executive and legislative authority in an area that includes more than one municipality. The municipality is the smallest district in the province, making up 16% of its geographical area. It consists of four local municipalities: Moqhaka, Metsimaholo, Ngwathe, and Mafube. The main attraction, the Vredefort Dome, is the third-largest meteorite site in the world, is located within the district, making it a tourist destination.

5.3 Moqhaka Local Municipality: Socio-Economic Environment

The Moqhaka LM is situated in the southern part of the Fezile Dabi DM. The former Kroonstad, Steynsrus, and Viljoenskroon Transitional Local Councils and sections of the Riemland, Kroonkop, and Koepel Transitional Rural Councils are included in the Moqhaka Local Municipality. A large proportion of the rural population is active within the agricultural sector (Moqhaka Local Municipality, 2020–21). Figure 5-3 below shows the position of Kroonstad (the study area) within the Moqhaka locality map.

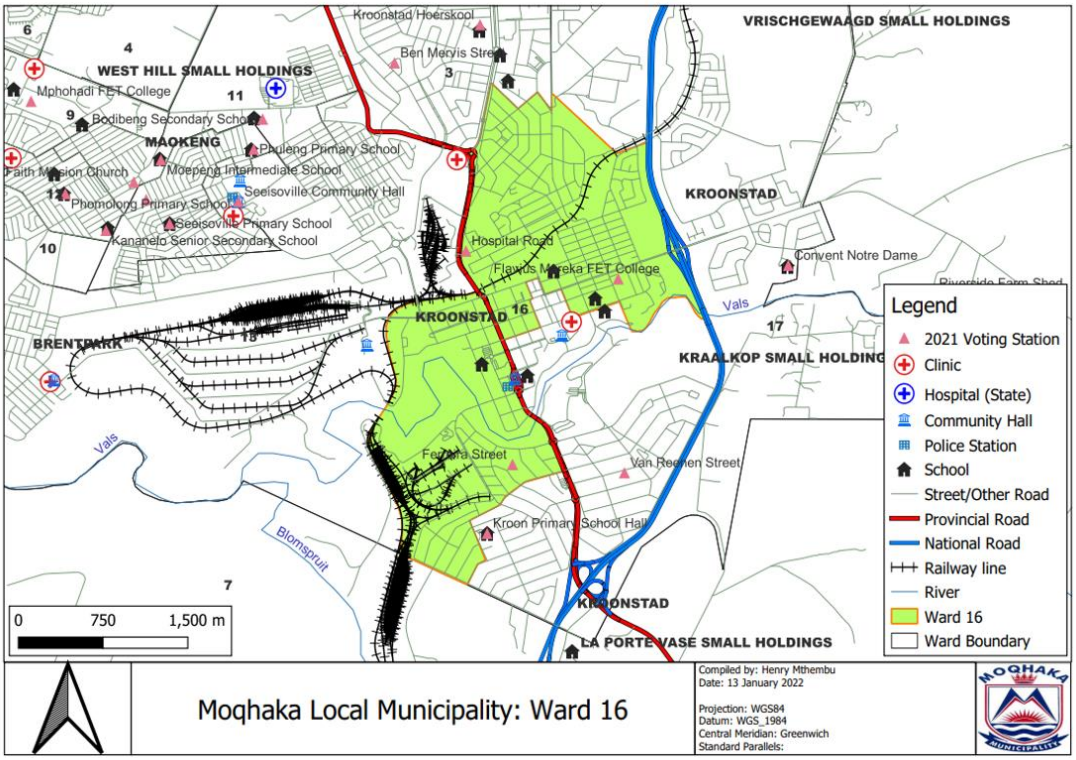

Figure 5-3: Moqhaka Local Municipality Ward 16 Map

Source: *Moqhaka Local Municipality IDP, 2022.2023-2026/2027*

Migration

An estimated 99% of the total population in the Moqhaka LM are South African citizens, and 1% come from the SADC countries (similar proportions are found in the Fezile Dabi DM) As is the case in the rest of the Free State, rural-to-urban migration is common.

Gender

In Moqhaka, females make up 51% of the population while men make up 49%. In Fezile Dabi DM, both male and female populations are 50%.

Age

Table 5-2 below shows the share of age groups within the Fezile Dabi DM and Moqhaka LM.

Table 5-2: Age Groups in Fezile Dabi DM and Moqhaka LM

Age Group	Fezile Dabi District Municipality	Moqhaka Local Municipality
<18	33%	32%
18-64	60%	60%
>65	7%	8%

***Source**: Fezile Dabi Wazi Maps*

Socio-economic profile

The socio-economic profiles of the district and local municipalities in which the proposed Bonsmara SEF will be located are depicted in the tables below, showing the employment status (Table 5-3), level of education (Table 5-4), and access to basic services (Table 5-5).

Table 5-3: Employment Status in the Fezile and Moqhaka District Municipalities

Employment Status	Fezile Dabi DM	Moqhaka LM
Employed	37%	34%
Unemployed	19%	18%
Discouraged job seeker	4%	4%
Not economically employed	40%	44%

***Source**: https://wazimap.co.za/profiles/district-DC20-fezile-dabi/?release=2016*

In the Fezile Dabi DM and the Moqhaka LM about 20% of the population is unemployed.

Educational profiles

The matriculation completion rate and grade nine completion rates for the district and local municipalities are shown in the table below.

Table 5-4: Fezile Dabi and Moqhaka Educational Profiles

Educational Attainment	Fezile Dabi DM	Moqhaka LM
Completed ninth grade or higher	68.5%	68%
Completed matric	38.9%	38%

***Source:** https://wazimap.co.za/profiles/district-DC20-fezile-dabi/?release=2016*

Access to basic services

Six categories of basic services in the Fezile Dabi and Moqhaka municipalities are shown in Table 5.5 below, reflecting the percentages of the population with access to these services.

Table 5-5: Fezile Dabi and Moqhaka Service Delivery Profiles

Basic services	Fezile Dabi DM	Moqhaka LM
Property ownership	71.3%	62.1%
Access to water	93.3%	90.5%
Access to electricity	93.4%	97.1%
Access to sanitation services	82.6%	92.7%
Refuse removal	86.5%	89.9%
Access to the internet	47%	43.5%

Source: https://wazimap.co.za/profiles/district-DC20-fezile-dabi/?release=2016

5.4 Environmental Parameters

The Fezile Dabi District Municipality's environmental profile is based on existing information made available by the Department of Forestry, Fisheries and the Environment (DFFE) in consideration of critical biodiversity, the National Freshwater Ecosystem Priority Area (NFEPA), air quality, climate risk and vulnerability, and climate change mitigation.

Table 5-6: Environmental Impacts

Features and Description	Impacts	Sensitivity
1. Aquatic biodiversity.	Based on the DFFE Screening Tool, the site contains areas of very high sensitivity due to the presence of wetlands and a Strategic Water Resources Area. The remaining area within the development footprint is deemed to be of Low sensitivity	High Sensitivity
2. Terrestrial Biodiversity	The Terrestrial Biodiversity Theme is Very High, with Ecological Support Area 1 & 2 (ESA) covering the site and broader surrounding area, as well as being adjacent to a private nature reserve. The site visit and assessment confirmed that the vegetation is natural and thus the ESA 1 & 2 categorisation is feasible. Due to having a low conservation status, in conjunction with having an ESA rather than a CBA categorisation, the grassland habitat is deemed to have a moderate sensitivity status and would potentially provide a suitable footprint for the proposed activity.	Very High sensitivity
3.Civil Aviation (Solar PV) Theme	The Kroonstad Airfield, located approximately 13 km from the site, is the closest airport.	Low
4.Visual Impacts	The site sensitivity verification finds the site to be of high landscape sensitivity.	High sensitivity
4. Archaeological and cultural heritage	The site sensitivity verification will be confirmed during the EIA Phase once the full site assessment has been completed.	Low sensitivity
5. Avifauna	Numerous priority bird species, including the Secretary Bird, Black-winged Kite, Pale Chanting Goshawk, and Northern Black Korhaan, are found in the study area. However, some of the priority bird species are not habitat bound to the area for nesting and/or foraging purposes.	Low sensitivity

6 ASSESSMENT OF POTENTIAL ENVIRONMENTAL IMPACTS

This section provides a summary of the assessment of potential environmental impacts likely to result from the project. These are inferred from the findings of similar projects in similar settings. However, in-depth investigations are imperative to ensure site-specific mitigation measures suitable for the local environment are conducted. Stakeholder engagement has afforded a deeper understanding of the local environment. The

significance ratings used for the different phases are based on studies from projects of a similar nature and are subject to confirmation in the assessment phase.

The legitimizing project phases, as determined by SiVEST, are considered:

- Planning and preconstruction
- Construction
- Operation
- Decommissioning.

Impacts identified in this assessment is for both the solar PV and the two grid alternatives from a social perspective.

6.1 Planning and Preconstruction

This is the initial phase of the project and can determine the impacts of subsequent phases of the project.

Project phase requirements:

- Public engagement to get the buy-in of local communities.
- Informed EIAs and SIAs legitimate and promote socially oriented decision-making.

Potential negative impacts:

- A lack of adequate public engagement can result in resistance to the project.
- If ESIAs are not undertaken diligently, some impacts may be underrepresented.

Table 6-1: Summary of Impacts in the Planning and Preconstruction Phase

Impacts	Generic Measures	Significance without Mitigation	Significance with Mitigation
1.Exclusion of communities	To be able to make informed decisions, the community must actively participate in the EIA process.	Medium-negative impacts.	Low-negative impacts.
2.Inadequate impact identification and mitigation e.g visual impacts	Use of specialist EIA teams.	Medium-negative impacts.	Low-negative impacts.

6.2 Construction phase

These are impacts that may be experienced during the construction stage. They can either be positive or negative.

Potential Positive Impacts

The development of new infrastructure in the area will attract investors, which may create employment opportunities for locals.

Potential negative impacts

The construction phase involves the removal of topsoil and vegetation that will leave the land scarified and this will reduce the agricultural potential of the land. These activities can also have a negative and irreversible impact on heritage features if any, for example unknown grave sites may be affected during construction.

Table 6-2 shows a summary of the environmental impacts associated with the construction phase and the necessary mitigation measures.

Table 6-2: Summary of Impacts during the Construction Phase

Impacts	Generic Mitigation	Significance Without Mitigation	Significance with Mitigation
1. Cultural Heritage	If any findings of cultural artefacts or bone and fossil remains are made, the operations must be stopped and a qualified archaeologist must be contacted for an assessment of the find. A chance find procedure should be put in place as part of the EMP.	Medium-negative impact	Low-negative impact
2. Graves	Any recorded cemetery must be avoided with a buffer zone of 30 meters. The site must be fenced, and access for family members must be ensured; alternatively, the graves can be relocated, adhering to all legal requirements.	Medium-negative impact	Low-negative impact
3. Impacts on biodiversity	Locate developments away from important habitat for faunal species, particularly those that are threatened.	Medium-negative impacts	Low-negative impact
4. Noise and dust pollution	Put noise buffers in place and provide employees with protective equipment, and masks for workers, and keep the land wet.	Medium-negative impact	Low-negative impact
5. Road and traffic hazards	Ensure that neighbouring roads are kept in good condition and that staff who are transporting employees and contractors adhere to traffic regulations.	Medium-negative impact	Low-negative impact
6. Loss of agricultural land	Avoid land that has agricultural potential. The layout of the facility has been designed to include only land that was identified as having soil limitations that make it unsuitable for supporting viable and sustainable crop production.	Medium-negative	Low-negative

Impacts	Generic Mitigation	Significance Without Mitigation	Significance with Mitigation
7. Visual impacts	Plan visual impact reduction measures such as natural engineered screens and buffers; and avoid use of CSP.	Medium-Negative	Low-negative
8. Land use and space requirements	The best alternative is the use of the utility scale PV system as it requires less space.	Medium-negative	Low-negative
9. Social impacts: job creation	On-the-job training for unskilled workers	Medium-positive	High-positive

6.3 Operational Phase Impacts at the Bonsmara Solar Energy Facility

These are impacts that may be expected during the operational phase of the project.

Potential Positive Impacts

- Employment opportunities.
- There will be infrastructural development which will attract more investors, thereby creating employment opportunities.
- The solar PV facility does not require water for electricity generation; hence, it is a water-saving option considering that South Africa in general is a water scarce country.
- The proposed development offers positive impact on agriculture by way of improved security benefits from the SEF that indirectly spills over through visible security that deters other crimes. For example, stock theft.
- The PV panels will not totally exclude agricultural production.

Potential Negative Impacts

- The location of the solar PV facility near cultural heritage sites and grave site is disruptive.
- Job losses mostly for unskilled and semi-skilled construction workers during the operational stage.

Table 6-3 below shows a summary of the environmental impacts associated with the operational phase and the necessary mitigation measures.

Table 6-3: Summary of Impacts During the Operational Phase

Impacts	Generic Mitigation	Significance without Mitigation	Significance with Mitigation
1.Hazardous material generation	Research and development on safer alternatives to clean the silicon wafer	High-negative impact	Medium-negative impact
2. Location of the solar PV facility near grave sites	Locate developments away from important cultural sites.	Medium-negative impact	Low-negative impact
3.Water resources	Solar PV do not use water for electricity generation, hence are water saving.	Low-positive impact	Low-positive impact

Impacts	**Generic Mitigation**	**Significance without Mitigation**	**Significance with Mitigation**
4.Visual Impacts	Plan natural engineered screens and buffers to reduce visual impact and avoid the use of CPS.	High-negative impact	Low-negative impact
5.Social Impacts: job construction workers.	Job creation and skills development.	Medium positive impact	Medium-negative impact
6.Cultural heritage	Locate developments away from cultural heritage sites.	Medium-negative impact	Low-negative impact

6.4 Decommissioning impacts

Positive and negative impacts

The general findings of EIAs undertaken for similar developments point to the potential negative impacts associated with decommissioning, such as the loss of project-related development, the challenges of recycling or disposing of the solar cells after their end of life, and the scarification of the land. Table 6-4 below shows the summary of impacts associated with the decommissioning phase.

Table 6-4: Summary of Impacts During the Decommissioning Phase

Impacts	**Generic Measures**	**Significance Without Mitigation**	**Significance with Mitigation**
1. Hazardous material waste generation	Research and development on recycling are needed to deal with the impacts	High-negative impact	Low-negative impact
2. The aesthetic value of the land is reduced.	Rehabilitation	Medium-negative impact	Low-negative impact
3.Socio-economic impacts	Ensure that the procurement policy supports local enterprises.	High-negative impact	Medium-negative impact

6.5 Cumulative Impacts

According to the Cornell Law School Information Institute (2020), the influence that a development will have when its impact is added to the incremental effects of other past, present, or reasonably anticipated future actions is known as its cumulative impact (cited by van der Walt, 2022). The importance of identifying and assessing cumulative impacts is that the whole is greater than the sum of its parts. There are already numerous substations and powerlines in the region, already affecting the visual quality and sense of place in this modified rural landscape. The Bonsmara PV Facility and other proposed facilities listed above have a combined footprint of approximately ~4 705 ha; although large, the facilities are far apart and do not constitute a spatially concentrated, high density network of PV facilities, which mitigates cumulative impacts. The use of solar PV is ecologically friendly hence will contribute to improved air quality, which will dd to positive cumulative impacts. However, the absence of a well-developed technology to recycle or dispose of the solar panels remains a challenge.

Table 6-5: Summary of Cumulative Impacts

Impacts	Generic Measures	Significance without Mitigation	Significance with Mitigation
1.Eco-friendly	Increased use of solar PV will contribute to improved air quality	Medium-positive impact	High-positive impact
2.Disposal of the solar PV Cells	The absence of a well-developed technology to recycle or dispose of the solar panels remains a challenge.	Medium-negative impact	Low-negative Impact
3.Visual Impacts	There are already numerous substations and powerlines in the region, already affecting the visual quality and sense of place in this modified rural landscape.	High-negative impact	Low-negative Impact

6.6 Overall Impact Rating

The impacts across the four phases are rated using the SiVEST matrix, which includes a description of the key monitoring recommendations for each applicable mitigation measure identified for each phase of the proposed development, for inclusion in the Environmental Management Programme (EMP) or Environmental Authorisation (EA). Table 6-6 below shows the ratings for overall social impacts.

Table 6-6: Rating of Potential Environmental Impacts

Environmental Parameter	Issue / Impact / Environmental Effect/ Nature	Environmental Impact Significance Before Mitigation									Recommended Mitigation Measures	Environmental Impact Significance After Mitigation								
		E	P	R	L	D	I/M	TOTAL	STATUS (+OR -)	S		E	P	R	L	D	I/ M	TOTAL	STATUS(=OR-)	
CONSTRUCTION																				
Noise impact	Noise at the site and the construction vehicles ferrying the panels and building materials	1	4	2	1	1	2	18	-	L	Installation of noise buffers	1	2	1	1	1	1	6	-	L
Impacts on biodiversity	Habitat loss to make way for large-scale solar facilities.	1	4	3	3	3	3	**42**	-	M	Locate developments away from important habitat for faunal species, particularly those that are threatened.	1	2	2	2	2	2	18	-	**L**
Loss of agricultural land	Is a function of the size of the area of land that is impacted and the production potential, of that impacted land.	1	2	3	3	3	3	36	-	**M**	Avoid land that has agricultural potential.	1	1	2	2	2	2	16	-	**L**
Cultural heritage impacts	If the solar PV facility is located near sacred areas, cultural practices will be affected. Recent archaeological field assessment conducted for	1	2	2	2	3	3	30	-	**M**	Construction near pristine natural regions, sacred sites, and communities should be avoided during site projects. It is important to conduct an archaeological assessment of the regions up for	1	1	1	2	2	2	14	-	**L**

Environmental Parameter	Issue / Impact / Environmental Effect/ Nature	Environmental Impact Significance Before Mitigation									Recommended Mitigation Measures	Environmental Impact Significance After Mitigation								
		E	P	R	L	D	I/M	TOTAL	STATUS (+OR -)	S		E	P	R	L	D	I/ M	TOTAL	STATUS(=OR-)	
	other solar PV facilities located approximately10km from the proposed development area identified some cultural remains but with varied value and preservation. It is likely that similar heritage resources may be present within this development area. (CTS Heritage, 2022).										development and evaluate any potential implications on such resources.									
Visual Impacts	The glint and glare surrounding the high reflectivity of the solar PV panels may distract motorists and aircraft.	1	4	3	3	3	3	42	-	**M**	Plan natural engineered screens and buffers to reduce visual impact and avoid the use of CPS.	1	3	2	2	2	2	20	-	**L**
Graves	Identification of human remains indicating a former burial place or the simple existence of a known cemetery during construction.	1	2	2	2	3	3	30	-	**M**	The recorded cemetery must be avoided with a 30m buffer zone. The site must be fenced and access for family members must be ensured; alternatively, the graves can be relocated, adhering to all legal requirements.	1	1	1	2	2	2	14	-	**L**
Road and traffic hazards	Heavy construction vehicles on poor roads will cause potholes to form, and accidents will rise.	1	4	3	3	3	3	42	-	M	Ensure the nearby roadways are maintained properly, and that traffic laws for transporting	1	2	2	2	2	2	22	-	**L**

Environmental Parameter	Issue / Impact / Environmental Effect/ Nature	Environmental Impact Significance Before Mitigation									Recommended Mitigation Measures	Environmental Impact Significance After Mitigation								
		E	P	R	L	D	I/M	TOTAL	STATUS (+OR -)	S		E	P	R	L	D	I/ M	TOTAL	STATUS(=OR-)	
											workers and contractors are adhered to.									
Land use and space requirements	Requirements for land and space to have the installation of the solar PV's.	1	4	2	1	1	2	18	-	L	The best alternative is the use of the utility scale PV system as it requires less space.	1	2	1	1	1	1	6	-	L
Social impacts: job creation	Creation of jobs and local economic opportunities	1	3	2	2	3	2	22	+	M	Ensure local employment policy is in place and on-the-job training for unskilled workers	1	2	1	1	2	1	7	+	L
OPERATIONAL																				
Hazardous material generation	Hydrochloric, sulphuric, and nitric acids are used to clean and purify the silicon wafer.	2	4	4	3	3	3	48	-	H	Research and development on safer alternatives to clean the silicon wafer.	1	3	3	3	2	2	24	-	M
Impacts on water resources	There is no need for water for electricity generation.	1	3	2	2	3	2	22	+	M	Use dry cooled plants.	1	2	1	1	2	1	7	+	L
Visual impacts	The glint and glare surrounding the high reflectivity of the solar PV panels may distract motorists and aircraft.	1	4	3	3	3	3	42	-	M	Plan natural engineered screens and buffers to reduce visual impact and avoid the use of CSP.	1	3	2	2	2	2	20	-	L

Environmental Parameter	Issue / Impact / Environmental Effect/ Nature	Environmental Impact Significance Before Mitigation									Recommended Mitigation Measures	Environmental Impact Significance After Mitigation								
		E	P	R	L	D	I/M	TOTAL	STATUS (+OR -)	S		E	P	R	L	D	I/ M	TOTAL	STATUS(=OR-)	
Cultural Heritage	Location of operations near cultural sites may disrupt cultural practices.	2	3	3	2	2	3	36	-	**M**	Locate developments away from cultural heritage sites.	1	2	2	1	1	2	14	-	**L**
Job creation for construction workers.	Increased employment providing skills development and local economic empowerment	2	4	2	2	3	2	26	+	M	Implement a training and skills development programme for locals. Work closely with the appropriate municipal structures regarding establishing a social responsibility programme	2	4	2	2	3	2	24	-	M
Decommissioning																				

Environmental Parameter	Issue / Impact / Environmental Effect/ Nature	Environmental Impact Significance Before Mitigation									Recommended Mitigation Measures	Environmental Impact Significance After Mitigation								
		E	P	R	L	D	I/M	TOTAL	STATUS (+OR -)	S		E	P	R	L	D	I/ M	TOTAL	STATUS(=OR-)	
Hazardous material waste generation	There are no recycling facilities or established scientific methods of disposing of the solar panels after the end of their useful lives.	2	4	4	3	3	3	48	-	H	Research and development on recycling are needed to deal with the impacts.	1	2	3	2	2	2	20	-	L
The aesthetic value of the land is lost.	Land scarification will occur during the decommissioning of the solar plants.	1	4	2	3	3	3	39	-	M	Implement rehabilitation, e.g., re-vegetation with indigenous species to prevent dust and erosion, as well as the establishment of alien species.	1	2	1	2	2	2	16	-	L
Socio-economic impacts	Job losses	2	4	4	3	3	3	48	-	H	Organise labour transfers to areas involved in similar projects.	2	3	3	2	2	2	24	-	M

Environmental Parameter	Issue / Impact / Environmental Effect/ Nature	Environmental Impact Significance Before Mitigation									Recommended Mitigation Measures	Environmental Impact Significance After Mitigation								
		E	P	R	L	D	I/M	TOTAL	STATUS (+OR -)	S		E	P	R	L	D	I/ M	TOTAL	STATUS(=OR-)	
Cumulative																				
Eco-friendly	Promotes good air quality given that it is a clean energy source.	2	4	3	2	3	3	42	+	M	Increased use of solar PV will improve air quality.	4	4	2	1	3	4	64	+	M
Disposal of the solar PV Cells	During decommissioning	1	4	2	3	3	3	39	-	**M**	The absence of a well-developed technology to recycle or dispose of the solar panels remains a challenge.	1	2	1	2	2	2	16	-	**L**

Environmental Parameter	Issue / Impact / Environmental Effect/ Nature	Environmental Impact Significance Before Mitigation									Recommended Mitigation Measures	Environmental Impact Significance After Mitigation								
		E	P	R	L	D	I/M	TOTAL	STATUS (+OR -)	S		E	P	R	L	D	I/ M	TOTAL	STATUS(=OR-)	
Visual Impacts	There are several substations and powerlines in the area, already affecting the visual quality and sense of place in this modified rural landscape.	3	4	4	2	3	3	48	-	**H**	The facilities are distant from each other and do not constitute a spatially concentrated, high density network of PV facilities, which mitigates the visual cumulative impacts. Advise other project owners to implement measures to mitigate the impact of these projects on visual intrusion and altered sense of place, such as screening (vegetation and/or berms) and limit the light pollution generated by these facilities.	2	3	3	1	3	2	22	-	L

7 COMPARATIVE ASSESSMENT OF ALTERNATIVES

7.1 No-Go Alternative

Based on the specialist's assessment, no significant impacts have been identified from an ecological/avifaunal/aquatic perspective should the development of the SEF not proceed. There is, however, a high negative impact from a social perspective for the no-go alternative. The option of not proceeding with the project implies that all the potential benefits, such as clean, readily available and cheaper electricity, will not materialise. Moreover, the new investments that may see an improvement in the infrastructure, new job creation, skills transfer, and enhancement of the national grid with renewable energy sources would not materialize.

For the grid alternatives the assessment has no preference on the options provided.

Table 7-1: Grid connection site alternatives

Alternative	Preference	Reasons (incl. potential issues)
GRID CONNECTION SITE ALTERNATIVES		
Grid Option 1	No preference	From a social perspective there is no preference on the grid options as n major significant impacts are anticipated.
Grid Option 2		

7.2 Conclusion

7.2.1 Summary of Findings

For the proposed project, the identified environmental and socio-economic benefits outweigh the negative environmental impacts, making the project beneficial, although this is subject to a comprehensive assessment of the impacts from the findings of the full impact assessment report,

From an environmental standpoint, it is determined that the adverse effects from the planning to the decommissioning stages are within acceptable parameters and can be adequately mitigated. The solar energy facility offers a cleaner, readily available, and cheaper energy source. Moreover, solar PV does not use water for electricity generation, so it has water-saving qualities. The renewable energy complex also aims to utilise existing infrastructure by connecting to the grid. The Solar PV facility will connect to the grid via a 2km 132kv powerline from the on-site substation to the Kroonstad switching station. Although it might limit agricultural use of the site due to land occupation and degradation when the land is cleared to make room for the solar energy facilities, the development also provides an alternate source of revenue to agriculture (Lanz, 2022). Agri-voltaic or dual solar projects, for instance, make use of solar PV plants to both produce energy and use the ground space beneath the panels for agricultural purposes. These projects have been launched in places like the Komati power station in Mpumalanga. This has the benefit of minimising the negative effects of solar installations on agricultural land (Kamanzi, 2022). This assessment's conclusion is that the project

offers a chance to integrate a renewable energy facility with agricultural production in a way that improves agriculture and causes little loss of possible future agricultural productivity. On the other hand, the glare and sparkle from the solar PV panels' high reflectivity can harm eyes and impair drivers and pilots of aircraft. Table 7-2 provides the details that form part of the Environmental Management Plan Programme.

Impact/Aspect	Mitigation/Management Actions	*Responsibility*	*Methodology*	Mitigation/Management Objectives and Outcomes	*Frequency*
• Maximise local employment and skills development opportunities associated with the construction phase	• The developer should aim to employ as many low-skilled and semi-skilled workers from the local area as possible. This should also be made a requirement for all contractors.	• The Developer & EPC Contractors	• Employ local contractors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria • Adopt a local employment policy to maximise the opportunities made available to the local labour force as far as possible (preference to Local Municipality) • Consideration must be given to women during the recruitment process • Set realistic local recruitment targets for the construction phase (preference to Local Municipality) • Training and skills development programmes must be initiated prior to the commencement of the construction phase	• Employment and business policy document that sets out local employment and targets completed before construction phase commences; • The majority of employed semi and unskilled labour are from the local area or local municipality; and • Training and skills development programme undertaken prior to the commencement of the construction phase.	Pre-construction and construction phase
• Maximise local economic multiplier effect during the construction phase	• Increase the procurement of goods and services, especially within the local economy	• The Developer & EPC Contractors	• A local procurement policy to be adopted to maximise the benefit to the local economy, where feasible • Develop a database of local companies, specifically Historically Disadvantaged (HD) companies which qualify as potential service providers (e.g. construction companies, security companies, catering companies, waste collection companies, transportation companies etc.) prior to the tender process and invite them to bid for project-related work where applicable • Source as many goods and services as possible from the local area (Local Municipality). Engage with local authorities and business organisation to investigate the possibility	• Local procurement policy is adopted • Local goods and services are purchased from local suppliers, where feasible (Local Municipality)	Pre-construction and construction phase
• To avoid or reduce the possibility of the increase in crime and safety and security issues during the construction phase	• To avoid or minimise the potential impact on local communities and their livelihoods	• EPC Contractor	• Access in and out of the construction camp should be strictly controlled by a security company. • The appointed EPC contractor must appoint a security company and appropriate security procedures are	• Employee induction programme, covering land access protocols, fire management and road safety. • The construction site is appropriately secured with a controlled access system.	Pre-construction and construction phase

Impact/Aspect	Mitigation/Management Actions	*Responsibility*	*Methodology*	Mitigation/Management Objectives and Outcomes	*Frequency*
			to be implemented to limit access to the site and surrounding areas. • Open fires on site for heating, smoking or cooking are not allowed, except in designated areas. • The contractor must provide adequate firefighting equipment on site and provide firefighting training to selected construction staff. • A comprehensive employee induction programme must be developed and utilised to cover land access protocols, fire management and road safety. • A grievance mechanism should be implemented whereby local landowners can express any complaints or grievances with the construction process	• Security company appointed and security procedures implemented.	
• To avoid or reduce traffic disruptions and movement patterns of local community during the construction phase	• To avoid or minimise the potential impacts associated with traffic and movement patterns on local communities	• The Developer & EPC contractor	• All vehicles must be road worthy, and drivers must be qualified, obey traffic rules, follow speed limits and made aware of the potential road safety issues • Heavy vehicles should be inspected regularly to ensure their road safety worthiness. • Implement penalties for reckless driving for the drivers of heavy vehicles as a way to enforce compliance to traffic rules. • Any damage / wear and tear caused by construction related traffic to the roads must be repaired. • Provide adequate and strategically placed traffic warning signs and control measures along the regional and secondary roads to warn road users of the construction activities taking place, displaying road safety messages and speed limits for the duration of the construction phase. Traffic warning signs must also be well illuminated at night. • A comprehensive employee induction programme that covers land access	• Vehicles are roadworthy, inspected regularly and speed limits are adhered to • Traffic warning signs along regional and secondary roads, also illuminated at night appointed and security procedures implemented. • Community liaison officer available for community grievances and communication channel	Pre-construction and construction phase

Impact/Aspect	Mitigation/Management Actions	*Responsibility*	*Methodology*	Mitigation/Management Objectives and Outcomes	*Frequency*
			protocols and road safety must be prepared. • Appoint a Community Liaison Officer and a create method of communication whereby local community members can express any complaints or grievances		
• Reduce the pressure on economic and social infrastructure and social conflicts from an influx of a non-local workforce and jobseekers during the construction phase	• To avoid or minimise the potential impact on economic and social infrastructure and reduce/eliminate social conflicts	• The Developer & EPC Contractor	• Where possible, make it a requirement for contractors to implement a 'locals first' policy. It is suggested that advertisement for construction employment opportunities be placed in a local newspaper, especially for semi and low-skilled job categories (preference to Municipality). • Enhance employment opportunities for the immediate locals this is not possible, then the broader focus areas should be considered for sourcing workers such as the Local Municipality • Prior to construction commencing, representatives from the local community e.g., ward councillor, surrounding landowners should be informed of details of the construction schedule and exact size of the workforce. • Recruitment of temporary workers at the gates of the development should not be allowed. A recruitment office located in town with a Community Liaison officer should be established to deal with jobseekers. • Have clear rules and regulations for access to the proposed site to control loitering. • A Community Liaison Officer should be appointed. A method of communication should be implemented whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process	• Percentage of the workers employed during construction come from local communities. • Community liaison officer available for community grievances and communication channel	Pre-construction and construction phase
• To avoid or minimise the potential impacts of	• To avoid and or minimise the potential noise and dust	• The Developer & EPC contractor	• Implement dust suppression measures for heavy vehicles such as wetting the roads on a regular basis	• Dust suppression measures implemented for all heavy vehicles	Construction phase Pre-construction & construction phase

Impact/Aspect	Mitigation/Management Actions	*Responsibility*	*Methodology*	Mitigation/Management Objectives and Outcomes	*Frequency*
noise and dust from construction activities during the construction phase	impacts associated with construction activities		and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers • Ensure all vehicles are road worthy, and that drivers are qualified and are made aware of the potential noise and dust issues • Ensure that drivers adhere to speed limits • A Community Liaison Officer should be appointed. A method of communication should be implemented whereby procedures to lodge complaints are set out in order for the local community to express any complaints or grievances with the construction process	that require such measures during the construction phase • Enforcement of strict speeding limits • Road worthy certificates in place for all vehicles • Community liaison officer available for community grievances and communication channel	

8 **OPERATIONAL PHASE**

Impact/Aspect	**Mitigation/Management Actions**	***Responsibility***	***Methodology***	**Mitigation/Management Objectives and Outcomes**	***Frequency***
• Maximise local employment and skills development opportunities associated with the construction phase	• Maximise local community employment benefits in the local economy .	• The Developer & Operator	• Adopt a local employment policy to maximise the opportunities made available to the local labour force (preference to Local Municipality) • The recruitment selection process should seek to promote gender equality and the employment of women, wherever possible • Establish vocational training programs for the local labour force to promote the development skills.	• The majority of workers are employed from local communities (Local Municipality). • A number of people attending vocational training throughout the operation phase.	Operation phase
• Reduce the visual and sense of place impacts associated with the operation phase of the project	• Reduce the visual disturbances to minimise the loss of the sense of place	• Operator	• Vegetation screening to be placed between the site and adjacent properties, if required.	• Vegetation screening if required/necessary.	Operation phase
• Loss of economic opportunity and upskilling	• Major social impacts associated with decommissioning phase are linked to the loss of jobs and associated income	•	• As part of the decommissioning phase, it would likely involve the disassembly and replacement of existing components with more modern technology therefore creation of additional construction type jobs although limited.	• It is recommended that the implementation of a reskilling, job placement, retrenchment and downscaling programme be implemented. •	Decommissioning

9 IMPACT STATEMENT

The proposed development can be authorised considering that solar energy is environmentally friendly and thus contributes to climate change mitigation, with minimal negative impacts limited to silicon component manufacturing and cleaning of the silicon wafer. However, South Africa imports already manufactured components, thus reducing the pollution borne during manufacturing. Moreover, solar energy provides an alternative, cheaper, and cleaner source of energy that is not dependent on coal. Once installed, it is cost-effective and readily available given the abundance of sunshine in South Africa. The proposed development will also have wider societal benefits by generating additional income and employment. In addition, the proposed development will contribute to the country's urgent need for reliable energy generation given Eskom's crippling blackouts. Moreover, the area being rural, solar PV's impact on agricultural viability is minimal compared to energy sources such as coal which has more of an impact on agricultural land use. All these positive impacts render the Bonsmara SEF beneficial to local communities and the country.

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11 APPENDICES

11.1 Appendix A: Specialist Declaration

11.2 Appendix B: Impact Rating Matrix

ENVIRONMENTAL PARAMETER		
A brief description of the environmental aspect likely to be affected by the proposed activity (e.g. Surface Water).		
ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity (e.g. oil spill in surface water).		
EXTENT (E)		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect the site
2	Local/district	Will affect the local area or district
3	Province/region	Will affect the entire province or region
4	International and National	Will affect the entire country
PROBABILITY (P)		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY (R)		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES (L)		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
DURATION (D)		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity.		

1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
INTENSITY / MAGNITUDE (I / M)		
Describes the severity of an impact (i.e. whether the impact has the ability to alter the functionality or quality of a system permanently or temporarily).		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
SIGNIFICANCE (S)		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula: **Significance = (Extent + probability + reversibility + irreplaceability + duration) x magnitude/intensity.**		

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

Points	Impact Significance Rating	Description
5 to 23	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
5 to 23	Positive Low impact	The anticipated impact will have minor positive effects.
24 to 42	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
24 to 42	Positive Medium impact	The anticipated impact will have moderate positive effects.
43 to 61	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
43 to 61	Positive High impact	The anticipated impact will have significant positive effects.
62 to 80	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
62 to 80	Positive Very high impact	The anticipated impact will have highly significant positive effects.