Socio- Economic Impact Assessment of

Proposed Vanrhynsdorp Solar and Hydrogen Energy Facility

March 2023

Prepared by

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Socio-Economic Impact Assessment Report:

Proposed Vanrhynsdorp ±10MW Solar Photovoltaic and Hydrogen Energy Facility
on Portion 7 of Farm 258, Vanrhynsdorp

Contents

EXECUTIVE SUMMARY

Proposed Vanrhynsdorp ±10MW Solar Photovoltaic and Hydrogen Energy Facility
on Portion 7 of Farm 258, Vanrhynsdorp

Purpose of Socio-Economic Assessment

The Socio-Economic Impact Assessment evaluates the intended (direct and indirect impacts) and unintended (residual) consequences on the human and natural environment caused by the proposed solar and hydrogen facility. Management measures are proposed to mitigate these consequences.

The proposed 10MW capacity solar and hydrogen facility which requires ±20ha of land with the remaining ±20ha reserved for supportive infrastructure is located north of Vanrhynsdorp within at most 3km. The consequences of development of such scale and extent on the Vanrhynsdorp community, requires an evaluation from a socio-economic perspective to inform the need and desirability thereof. The site is reached via private gravel roads accessed from the R101 via the N1 or R45.

Proposed Solar and Hydrogen Facility

The facility will comprise Solar PV generation, battery storage and electrical reticulation equipment. The solar field will comprise rows of panels called strings arranged to capture the most sunlight**.** The panels are typically up to 2.28m x 1.134m in area and each panel is mounted on a metal frame. The arrays (and 5m wide) are either fixed on a tracking system or titled at an angle equivalent to the site latitude to maximize the exposure to sunlight. The arrays typically reach ±1.8-2.5m above ground level. An array of PV Panels faces due north and running east to west across the site. The PV array area will not need to be graded flat. The foundation supporting the panel arrays will comprise concrete or screw pile type foundations and the final design will depend on the site-specific conditions. The transmission line is an 11 kV overhead line of approximately 3km connecting to the existing power supply infrastructure of Eskom and used to supply electricity to Matzikama Municipal area.

The hydrogen plant consists of containers that include an electrolyser, electrolyser ancillaries, electrical substation, compression installation, power transformer, control room, instrument and analysis room, storage, refilling station and space for trailers refilling. The infrastructure associated with the Hydrogen plant can be compared to normal industrial installations of limited extend and height. All buildings are at most the height of a single-story building and where buildings are higher, their height do not exceed that of a double story building. The proposed hydrogen plant will be built alongside the already approved but lapsed Solar PV Plant, within the approved footprint area. The site will accommodate support infrastructure such as a site office, switching gear and internal roads. The site will be secured with a fence and the facility will be connected to the nations grid with a grid connection line. The combined Solar PV and Hydrogen energy facility will occupy a footprint of approximately ±20ha.

Impacts addressing community needs

Of note are the following impacts of the proposed solar and hydrogen facility:

- Supply of bulk services unlocking economic opportunities;
- Improved proximity to work and generation of jobs;

These impacts generated by the proposed solar and hydrogen facility address the social and economic status of the receiving community significantly. Key insights from interviews and needs expressed in Matzikama IDP, 2017 – 2021, confirmed the social and economic status of the broader Vanrhynsdorp and Matzikama community. The table below presents the social and economic needs that the proposed solar and hydrogen facility is likely to address.

Social and economic status and needs	**Significant Impacts of the proposed mixed-use development**
Economic growth is slow.	Generation of Electricity for Vanrhynsdorp & Matzikama Municipality
Unemployment is high and keeps rising.	Improved proximity to work and job generation
Financial Sustainability of service delivery vs strong dependency on grants (indigent).	Supply of bulk services unlocking economic opportunities and settlement (housing) development
Quality of the living environment including municipal services, social spaces – some creating vibrancy and some peace and quietness and recreational facilities.	Creating sustainable settlements operating with green energy
Housing and ownership particularly for backyarders whom constitute the biggest segment of the housing waiting list.	Supply of bulk services unlocking economic opportunities
Cultural and heritage resources need protection to keep tourism growing:.	Vanrhynsdorp enhances its status as a business destination and proposed solar development can contribute to conservation of reserves in close proximity.
Affordable opportunities to access Further Education and skills development that result in employment. Upgrading of schools and crèches	Social investment target scarce subjects in schools.
Rehabilitation support / family relief - working population at home, not economically active yet caring for family members unable to do so themselves.	No direct contribution to these specific facilities is made

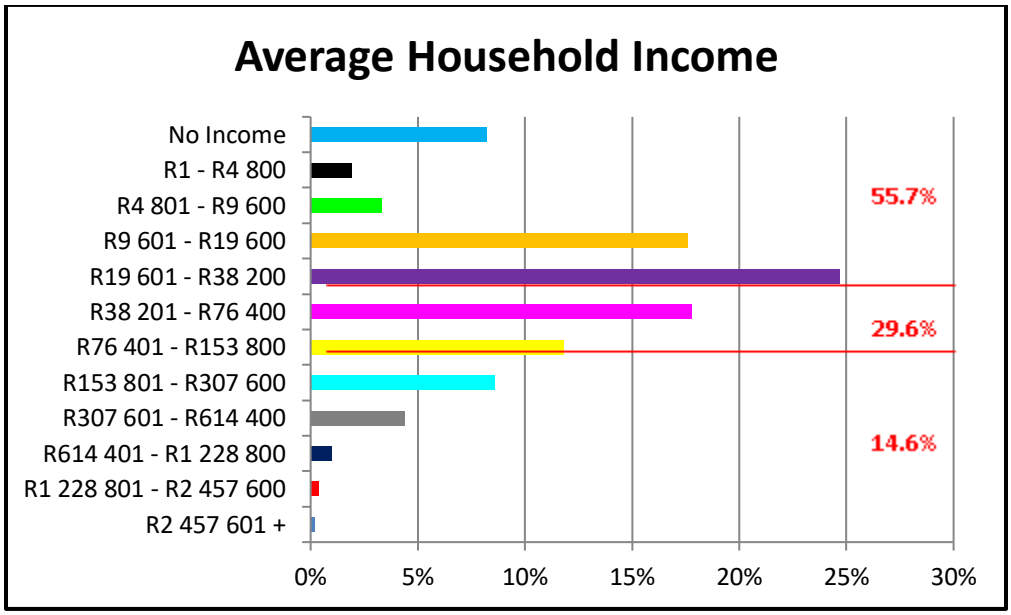
Decreased maternal and child health amongst women and children:	Indirectly
Safety and social well-being as the number of street kids increases.	Indirectly

Receiving Community

In 2021, the Matzikama Local Municipality had a total population of 72 759 and this included 21 172 households with an average household size of 3.8 people per household. (Source: Matzikama SEP, 2021).

According to StatsSA2011, 37.5% of households have partners who are married or either living like married partners. Thus, 62.6% of households are single parents according to different variables such as: never married (56.6%), widow/widower (4.2%), separated (0.5%) and divorced (1.3%). The population of the municipal area is quite evenly distributed in terms of gender with 49.9% representing females and 50.1% representing males. The population of Matzikama is relatively young with the Youth (0-14) making up 26.8% of the total population, the Working Age Population (15-64) making up 66.9% of the total population and the Elderly (65+) making up 6.3% of the total population

According to Stats SA, 2011, 55.7% of the households within the municipal are earned less than R3 500 per month and as indigent households, qualify for subsidized housing and free civil and electrical services provision.



Of the total working age demographic (15-64), 53% fall under Employed, 35.5% fall under Not Economically Active, 8.7% fall under Unemployed and 2.9% fall under Discouraged Work Seeker.

The unemployment rate for Matzikama was 13.3% in 2020 and estimated to have increased to 16.4% in 2021.

In 2020, the municipal area had 26 057 employed workers. Of the employed workers, 20.9% were employed in the informal sector and 79.1% were employed in the formal sector. The majority of the formally employed people in the Matzikama municipal area consist of low-skilled workers, which represents 41.8% and semi-skilled workers, which represents 24.8% of the total formally employed workforce. The number of skilled workers who are formally employed amount to 12.5% of the total.

In 2019, of the total households, 68.4% had their refuse removed weekly, 88.1% had access to electricity for lighting, 96.3% had piped water inside the dwelling and 69% had access to a flush/chemical toilet.

According to Stats SA 2011, in Matzikama, 39.1% of households own their home and it is fully paid for, 6.6% of households own their home but it is not yet paid off and 25.2% of households rent their homes.

The Matzikama Local Municipality approximately contributed R4 470 million to the economy and GDP of the West Coast District. In 2020, the Agriculture Sector remained the largest contributor to the Matzikama Local Municipality's GDP with a figure of 25.1%. The Trade Sector's contribution, despite its contraction, remained the second largest contributor with a figure of 13.9%. This is then followed by the Finance Sector (13.3%), then the Manufacturing Sector (13%), then the General Government Sector (10.9%) and then the Community Services Sector (9.2%). The sectors that contributed the least were: the Transport Sector (5%), the Construction Sector (3.4%) and lastly the Electricity, Gas and Water Sector with 2%.

Though income disparity, and hence the poverty rate is high, the community is stable and resilient.

Approach and Assumptions

The approach to the study is directed by the requirements for Environmental Impact Assessments and the Guidelines for Social Impact Assessments (SIA) and Economic Impact Assessments (EIA) commissioned by the department of environmental affairs and development Planning (DEA&DP).
Hence, this Social Economic Impact Assessment (SEIA)

- reviews the social status of the receiving community,
- identifies and verifies development impacts and ascertains the significance of impacts and likely management and mitigation measures through communication with the developer, specialists and key project team members;
- Rates the confirmed impacts as per the recommended scale (Addendum A) informed by the relevant communications.
- Concludes the assessment result.

This socio-economic assessment was limited, as the development alternative assessed is the preferred alternative. Furthermore, the following assumptions and limitations shaped the impact assessment:

a) The event of a complete demolition phase is unlikely and has not been assessed.
b) There is a high degree of certainty that a solar and hydrogen facility will take place; however, the no-go alternative was assessed to benchmark the status quo.
c) Calculation of the number of jobs created was based on limited information sources, i.e., estimates and indicative data from specialist reports only.
d) Interviews are not representative but indicative as a sample of people is not interviewed, but rather people representing the receiving community.

Policy and Planning Context

An analysis of the compatibility of the proposed project with the relevant sector policies and development plans concluded that the proposed solar and hydrogen facility is compatible with the following National and Provincial plans and policies:

White Paper on Energy Policy for the RSA (1998);

- White Paper on Renewable Energy (2003);
- National Energy Act (2008);
- National Alternative Energy Strategy (2009);
- National Spatial Development Framework (2006);
- Western Cape Provincial Spatial Development Framework (PSDF), March 2014 revised 2019
- Matzikama Spatial Development Framework;
- Matzikama IDP
- Matzikama Human Settlement Plan;

The proposed development represents a solar and hydrogen facility with amenities and employment opportunities within walking distance.

Impacts, Direct, Indirect and Residual

Overall, the impacts generated by the proposed solar and hydrogen facility are:

Direct positive impacts are:

Generating employment

- During construction, the generation of 30 jobs and a wage bill of R3.4 million over 6 months and R3 million benefitting the 27 locals, providing 15 unskilled, 10 semi-skilled and 2 skilled people employment.
- During operations, the generation of 3 jobs, and a wage bill of R14 million for the first ten years of which R13 million will benefit locals and R1 million per annum is spend.
- During decommissioning, the creation of 9 jobs but 30 people employed with a wage bill of R2.3 million over 4 months and R2 million benefitting the locals, providing 17 unskilled and 11 semi-skilled and 2 skilled local people employment opportunities and contributing <1% to the Matzikama GDP;

Contributing to the Matzikama GDP

- During construction, operations and decommissioning <1% to the Matzikama GDP mainly from sales generated from wage bill, material and services, and selling R11.2 million's electricity.

Generating work within <1km proximity, during operations.
Broadening municipal tax basis as taxes is calculated equal to business premises, during operations.
Enhancing supply of bulk services as 10MW and 6500 households are provided with electricity, during operations.

Indirect positive impacts are:
Improved skills and educational levels

- During construction, operations and decommissioning, skills development as informal training takes place.
- During construction and operations raising awareness of career options having skilled and semi-skilled others present in the community working on the solar and hydrogen facility;
- During operations, increased levels of education as personal choices in the world of work are enhance by supporting the teaching of scarce school subjects.

Increased SMME participation as services, including maintenance services are rendered, during operations

Residual Impacts are:
Improved self-image, being hold in high esteem and family coherence of vulnerable people

- Improved family coherence as young women and youth are hold in high-esteem, during construction, operations and decommissioning.
- Youth's self-esteem developed and found employment (employment equity) and development opportunities resulted from social investment during construction, operations and decommissioning.
- Family structure changes as family members are becoming available to work.

Growth in tourism as conservation tourism is indirectly enhanced by alternative energy generation.

Direct negative impacts are:
Changed sense of place

- During construction and decommissioning and within limits, though negative, increased use of social amenities and services, decreased road safety and increased noise and dust.
- During construction, operations and decommissioning, the change in the sense of place. During decommissioning the land return to cultivated wheat fields.

Loss of agricultural land

- During operations, Loss of ±40ha agricultural land, whilst conservation is promoted.

Loss of employment

- During decommissioning Retrenchment and loss of income for 3 employees maintaining the solar and hydrogen facility.

Loss of social benefits

- During decommissioning, social benefits ceased enabling individual achievement and development benefits the Matzikama/ Vanrhynsdorp community.

Indirect negative impacts are:

Though unlikely, increased crime during construction and decommissioning.

Negative Residual Impacts:

Dilution of local economy and culture, during construction and decommissioning.

Cumulative Impacts

The cumulative impact associated with the proposed solar and hydrogen energy facility is largely of a visual nature and loss of agricultural land.

The presence of the PV panels on stands and the hydrogen plant and associated infrastructure and the associated impact on the sense of place of the surroundings was rated low. The significance of the visual impact, specifically the impact on the local sense of place, of the other facilities within the 30km radius is also rated as low as these facilities are located around Vredendal. The two settlements and the renewable energy facilities are not visible from one settlement to another.

The cumulative loss of agricultural land has a low impact as low potential agricultural soils that can only be used for grazing were selected for the different sites. The loss for agriculture relates to loss of grazing capacity which is not significant.

This study does not assess the overall cumulative impact i.e., the optimal number and location of solar facilities in the area, on the rural character and the sense of place of the surroundings or the agricultural ability and carrying capacity of the area.

No Go Alternative

The No-Go Alternative would lose an opportunity for South Africa to supplement its current energy needs with clean, renewable energy and achieve its targets. Not reaching its targets and being one of the highest per capita producers of carbon emissions in the world (80% emission for energy use vs. 49% for developing countries) this alternative represents a negative impact socially and environmentally.

Furthermore, the No-Go Alternative will also

- a) Result in a loss of employment opportunities generated during construction and operations.
- b) Result in no social investment to support specific social (improvement of education in scarce subjects) and economic (enhancing small businesses) initiatives as identified by the specialist studies and developers.

This alternative represents a negative social cost particularly for the local community.

Summary of impacts during the Construction Phase and Conclusion

Overall, the construction phase brings about some direct and positive impacts, direct and negative impacts and indirect positive and negative impacts.

Direct and Positive Impacts during the Construction Phase are tabulated below:

Table 1: A summary of direct and positive impacts, Construction Phase

	Impact (s)	*Environment*	*Experienced as*	*Population Unit*	*Rating*	*Mitigated*
A	Employment opportunities increase	Economic:	Working age people find employment temporarily and permanently: 30 Jobs at R3.4 million.	Individual, family and community	Low Positive	Moderate Positive
B	Increased Income	Economic and Social	Working age person find employment and contribute to household income	Family	Low Positive	Moderate Positive
C	Skills development of working age population (6 618)	Economic:	Skills development of those that find employment temporarily and longer term	Individual	Low Positive	Low Positive
D	Improved Local Economy and Increased Sales	Economic	Increased sales and income: <2% contribution to Matzikama GDP	Community	Low, Positive	Low, Positive

Direct and Negative Impacts during the Construction Phase are tabulated below:

Table 2: A summary of direct and negative impacts, Construction Phase

	Impact (s)	*Environment*	*Experienced as*	*Population Unit*	*Rating*	*Mitigated*
E	Increased Use of Social Amenities & Service	Social & Economic	Diminishing social amenity and services capacity	Community	Low Negative	Nearly Neutralized
F	Increased traffic levels	Economic	Motorized and non-motorized traffic levels increase	Community	Low Negative	Low Negative
G	Increased noise & dust levels	Social (Health)	Living conditions turn harsher with increased dust and noise.	Individuals & Family	Low Negative	Neutralized

H	Change in sense of place	Social	Living environment change	Community	Low Negative	Low Negative

Indirect Impacts during the Construction Phase are tabulated below:

Table 3: A summary of indirect impacts, Construction Phase

	Impact (s)	***Environment***	***Experienced as***	***Population Unit***	***Rating***	***Mitigated***
I	Community stability & homogeneous ness	Social	Influx of people (employed and unemployed) permanently or semi-permanently looking for work / in anticipation to access employment	Individual	Low Negative	Low Negative
J	Crime and Offences	Social	Prevalence of criminal incidence experienced	Individuals, family and community	Low Negative	Nearly Neutralized

Residual Impacts during the Construction Phase are tabulated below:

Table 4: A summary of residual impacts, Construction Phase

	Impact (s)	***Environment***	***Experienced as***	***Population Unit***	***Rating***	***Mitigated***
K	Youth's self-esteem develops	Social	Youth people find employment temporarily and permanently	Individual, family and community	Low Positive	Moderate Positive
M	Employment equity of vulnerable groups	Social	Youth and Women find employment temporarily and permanently	Community and Individual	Low Positive	Moderate positive

Summary of Impacts during the Operational Phase

Overall, the operational phase brings about some direct and positive impacts, direct and negative impacts and indirect positive and negative impacts.

Direct and Positive Impacts during the Operational Phase are tabulated below:

Table 5: A summary of direct and positive impacts, Operational Phase

	Impact (s)	*Environment*	*Experienced as*	*Population Unit*	*Rating*	*Mitigated*

A	Increased Employment opportunities	Economic	Working age people find employment temporarily and permanently	Individual, family and community	Moderate Positive	High positive
B	Increased Income	Economic	Income of families increases as working age people are employed	Family	Low Positive	Moderate Positive
C	Increased Skills	Economic	People find employment temporarily and permanently as their employability improve	Individual and Families	Low Positive	Moderate Positive
D	Growth of local economy and increased sales	Economic	Increase in sales, income and spending	Community	Moderate Positive	Moderate Positive
E	Proximate work locations	Economic	Employment opportunities are close to where working age people live	Individual, family and community	Moderate Positive	Moderate Positive
F	Broadened municipal tax basis	Economic	Well maintained settlement environment	Family and community	Moderate Positive	No Mitigation
G	Enhanced supply of Bulk Services	Economic (and Social)	Electricity is generated and distributed.	Individual, family and community	Moderate positive	High Positive
H	Change in sense of place	Social	Living environment change	Community	Moderate Negative	Low Negative

Direct and Negative Impacts during the Operational Phase are tabulated below:

Table 6: A summary of direct and negative impacts, Operational Phase

	Impact (s)	*Environment*	*Experienced as*	*Population Unit*	*Rating*	*Mitigated*
I	Loss of Agricultural Potential and Land	Economic	Decline in food security potential	Community	Low Negative	Low Negative

Indirect Impacts during the Operational Phase are tabulated below:

Table 7: A summary of indirect impacts, Operational Phase

	Impact (s)	*Environment*	*Experienced as*	*Population Unit*	*Rating*	*Mitigated*
J	Increased levels of education (Individual development)	Social, Economic	Enhanced personal choices in world of work as people gain skills and experience	Individual and Family	Moderate Positive	Moderate Positive
K	Increased SMME participation	Economic	Increased economic participation by individual small business owners	Community	Low Positive	Moderate Positive

Residual Impacts during the Operational Phase are tabulated below:

Table 8: A summary of residual impacts, Operational Phase

	Impact (s)	***Environment***	***Experienced as***	***Population Unit***	***Rating***	***Mitigated***
L	Self-esteem and image of Youth and women improve	Social	Youth find employment temporarily and permanently	Individual, family and community	Low Positive	Moderate Positive
M	Growth in Business Tourism	Economic	Economic Growth and conservation of threatened vegetation	Community	Low Positive	Moderate Positive

Summary of impacts during the Decommissioning Phase

Overall, the construction phase brings about some direct and positive impacts, direct and negative impacts and indirect positive and negative impacts.

Direct and Positive Impacts during the Decommissioning Phase are tabulated below:

Table 9: A summary of direct and positive impacts, Decommissioning Phase

	Impact (s)	***Environment***	***Experienced as***	***Population Unit***	***Rating***	***Mitigated***
A	Employment opportunities increase	Economic: 30 jobs, 4 months	Working age people find employment temporarily and permanently	Individual, family and community	Low Positive	Low Positive
B	Increased Income	Economic and Social	Income of families increases as working age people are employed	Family	Low Positive	Low Positive

C	Skills development of working age population	Economic	Skills development (informal) of those that find employment temporarily.	Individual	Low Positive	Low Positive
D	Increased Local Sales and GGP	Economic: Low contribution: <1%	Increase in income	Community	Low Positive	Low Positive

Direct and Negative Impacts during the Decommissioning Phase are tabulated below:

Table 10: A summary of direct and negative impacts, Decommissioning Phase

	Impact (s)	***Environment***	***Experienced as***	***Population Unit***	***Rating***	***Mitigated***
E	Increased Use of Social Amenities & Services	Social & Economic	Diminishing social amenity and services capacity	Community	Low Negative	Nearly Neutralized
F	Increased traffic levels	Social	Motorized and non-motorized traffic levels increase	Community	Low Negative	Low Negative
G	Increased noise & dust levels	Social (Health)	Living conditions turn harsh with increased dust and noise	Individuals & Families	Low Negative	Neutralized
H	Change in sense of place	Social	Living environment change	Community	Low Positive	Moderate Positive
I	Retrenchments	Social	Loss of Income	Individual	Moderate Negative	Moderate Negative
J	Social benefits ceased	Social	Individual achievement and development benefit the Vanrhynsdorp community	Individual, Family and Community	High Negative	Moderate Negative

Recommendation
The proposed solar and hydrogen facility is deemed acceptable as it is:

Generating employment equal to 39 full-time jobs during all three phases benefitting the locals
Contributing at least R1million per annum to the local wage bill
Generating work within <1km proximity, during operations.
Enhancing supply of bulk services as 10MWh is generated and approximately 6500 households can be provided with electricity, during operations.

Mitigation measures to be included into the EMPR are summarized in Section 4 of the Assessment.

The proposed solar and hydrogen facility as a whole should be authorized.

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
	12/12/20/
File Reference Number:	DEAT/EIA/
NEAS Reference	

Application for authorization in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010

PROJECT TITLE

Proposed Vanrhynsdorp ±10MW Solar Photovoltaic and Hydrogen Energy Facility
on Portion 7 of Farm 258, Vanrhynsdorp, Western Cape Province

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Specialist: Contact person: Postal address: Postal code::	Anelia Coetzee (MURP & MBA)		
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Project Consultant:	Enviro EAP Environmental Consultants		
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Postal code:	7287		
Telephone	076 963 6450		
E-mail:	nicolaas@enviro-eap.co.za		

The specialist appointed in terms of the Regulations_

I, Anelia **Coetzee**, 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;

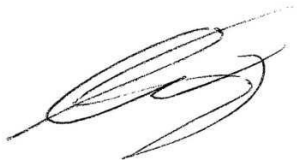
I will comply with the Act, regulations and all other applicable legislation;

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 71 and is punishable in terms



Signature of the specialist:

Leap Sustainable Development cc (BEE Level Four Contributor)

Name of company (if applicable):

Date: 10 March 2023

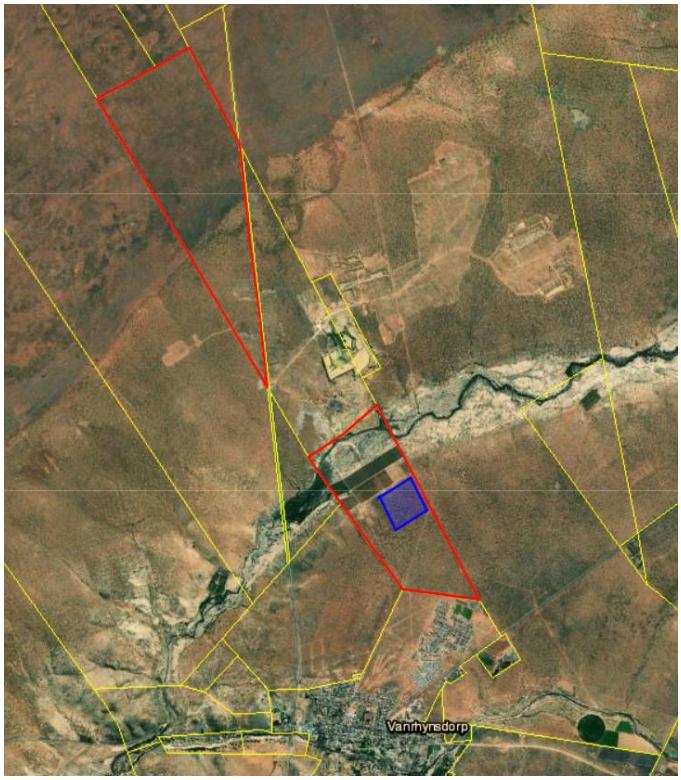
Socio-Economic Impact Assessment Report:

Proposed Vanrhynsdorp ±10MW Solar Photovoltaic and Hydrogen Energy Facility
on Portion 7 of Farm 258, Vanrhynsdorp

Section 1: Project Overview and Assessment Scope

1.1 Introduction

EnviroAfrica cc was appointed by Roma Energy Vanrhynsdorp (Pty) Ltd as Environmental Assessment Practitioners to undertake an Environmental Impact Assessment for a proposed solar and hydrogen facility on Portion 7 of Farm Duinen 258 and 708ha in extent, Vanrhynsdorp, in the Matzikama Municipality, Western Cape. Leap Sustainable Development was appointed by EnviroAfrica cc to undertake a specialist Social Impact Assessment (SIA) as part of the Environmental Impact Assessment application.



1.2 Description of Proposed Development and Alternatives

Location, extent and elevation

A Solar PV generation facility is proposed by Roma Energy Vanrhynsdorp (Pty) Ltd and is located north of Vanrhynsdorp but south of the Droë River. The nearby Eskom substation north of Vanrhynsdorp is less than 3km from the substation. The proposed solar and hydrogen facility measures ±38 -40ha and include a ±20ha footprint for the combined solar component and the hydrogen plant. The hydrogen plant's footprint is limited to 0.8ha. The remaining 18 -20ha include support infrastructure.. The site on Portion 7 of Farm Duinen 258 is reached via a gravel road across Reminder of Er 1 (settlement commonage) and across the farm Duinen.

The site slopes very slightly from the south-east towards the north-west (direction Droë River). Elevation varies from 151 m (south-east corner) towards the north-west at 145 m with an average slope of 0.7% and an elevation loss of approximately 9 m.

Generated Product

Solar PV technology is a method of generating electrical power by converting solar radiation using semiconductors through a process known as the Photovoltaic Effect. It is not the heat required from the sun but the amount of irradiation available that allows for electrical energy to be generated. The use of solar energy, a natural resource, is non-consumptive and emits zero greenhouse gasses. This effect refers to photons of light colliding with electrons, and therefore placing the electrons into a higher state of energy to create electricity.

Project Components

The number of panels comprising the array will depend on the solar resource at the site, the installed capacity and the choice of panels. The solar field will comprise rows of panels called strings arranged to capture the most sunlight. The panels are typically up to 2.28m x 1.134m in area and each panel is mounted on a metal frame. The arrays (and 5m wide) are either fixed on a tracking system or titled at an angle equivalent to the site latitude to maximise the exposure to sunlight. The arrays typically reach ±1.8-2.5m above ground level. An array of PV Panels faces due north and running east to west across the site. The PV array area will not need to be graded flat. The foundation supporting the panel arrays will comprise concrete or screw pile type foundations and the final design will depend on the site-specific conditions.

Hydrogen Plant

A Hydrogen plant consist of containers that include an electrolyser, electrolyser ancillaries, electrical substation, compression installation, power transformer, control room, instrument and analysis room, storage, refilling station and space for trailers refilling. The infrastructure associated with the Hydrogen plant can be compared to normal industrial installations of limited extend and height. All buildings are at most the height of a single-story building and where buildings are higher, their height do not exceed that of a double story building.

The proposed PV Plant consists of:

- **PV Cells**: A basic PV device, which generates electricity when exposed to solar radiation. All PV cells produce Direct Current (DC) electricity;
- **PV Modules or Panels**: The smallest complete assembly of interconnected PV cells. The modules are typically mounted in a lightweight aluminium frame to form a panel.
- **PV Arrays**: A group of PV panels connected together is termed as PV Array. An interconnected system of PV modules that function as a single electricity producing unit. The proposed PV panels are approximately 2.28/2.5 m in height and 5m in width. These panels (and 1.134m wide) will be fixed to the ground on a centred or screw pile type foundation.
- **Mounting Structures**: The mounting structure is a metal frame used as structural support for the PV array which are comprising fixed to the ground on a centred or screw pile type foundation.

The proposed Hydrogen Plant consist of:

- **Containers** housing most components of the plant, **tanks** mounted horizontally, a compression installation.

A transmission Line will then connect the PV Plant with the connection point of the power station. The transmission line is an 11 kV overhead line of approximately 2-3km connecting to the existing substation north of Vanrhynsdorp.

No site alternatives or development alternatives are proposed except for the no go alternative.
The facility will be developed to provide approximately 10MW.

1.3 Purpose of the Assessment

A Socio-Economic Impact Assessment analyses (predicting, evaluating and reflecting) and manages the intended and unintended consequences on the human environment of planned interventions (policies, programmes, plans and projects) and any social change processes invoked by those interventions so as to bring about a more sustainable and equitable biophysical and human environment (Vanclay, 2002).

At a broad level the impacts on the overall welfare of a community should be investigated considering the efficiency, equity and sustainability of the project as well as the trade-offs or 'opportunity cost' the various alternatives will yield.

1.4 Approach

The approach to the study is directed by the requirements for Environmental Impact Assessments and the Guidelines for Social Impact Assessments (SIA) and Economic Impact Assessments commissioned by DEA&DP i.e.:

- Review of project information and preliminary social statement as part of other reports, which included
    - Collection and synthesis of baseline socio-economic data on the area;
    - Identification of project results and key social variables and the impact of the project results on the receiving society and economy, as per Guidelines for Social Impacts;
- Verification of some results, social variables and impacts through communication with the developer, specialists and key project team members, as per bibliography;
- Ascertain significance of impacts through a round of interviews and correspondence with a limited number of community members, specialists and key project team members.
- Rate the confirmed impacts as per recommended scale (Addendum A) informed by the results of the interviews with various parties as outlined above.
- Recommending management measures to mitigate the impacts of the proposed development.
- Conclusion of Social Impact Assessment (SIA) and recommendations

1.5 Assumptions & Limitations

The following risks and level thereof, are inherent to the proposed development.

Table 11: Inherent Risk Overview Matrix_ Vanrhynsdorp Solar & Hydrogen Facility

Risks	Extend	Duration	Intensity	Probability	Confidence	Element	Proposed Solar & Hydrogen Facility
Inequality	Local Direct	Permanent	Moderate	Likely	Moderate	Employment, Opportunities to operate related businesses	Benefits all (low, middle and high)-income groups overall and gender;
Social Fabric	Local Indirect	Temporarily	Low	Unlikely	Moderate	Scale (extent) Labour force	Construction Phase: Labour travel to site daily, not temporarily located on site.
Livelihoods	Local Direct	Permanent	Moderate	Likely	High	Income generation opportunity (ies)	Does not take away; does create reliable energy source.
Vulnerable communities	Local Indirect	Permanent	Moderate	Unlikely	Moderate	Vulnerable community members (& absence of concentration of): women, elderly, children, dependents;	Does not directly impact: does create reliable energy source
Critical resources	Local Direct	Permanent	Low	Likely	Moderate	Water, energy and clean air	Operates according to national and international standards, and contribute to reliable & safe resource.
Economic vulnerability	Local Indirect	Permanent	Low	Likely	Moderate	Population size, merchandise export concentration, share of agriculture in GDP homelessness (natural disasters) instability of agricultural production, instability of exports of goods and services, (Human Asset Index): - Health:<5, maternal mortality rate, stunting and - Education (gross secondary school enrolment & gender parity, adult literacy)	Stable Expansion Minor (8th biggest out of 10 contributors) Additional capacity Stable Steady Access to health services & education enhanced
Sustainability	Local Direct	Permanent	Moderate	Likely	Moderate	Balance between social, economic & natural; Able to meet present needs without negatively impacting on future	Contributes to economic development and meeting present needs, whilst managing future impacts
Extend: Local or Regional, Duration: Short, Medium and Long term and Permanent, Intensity: Low, Medium, High and very High (Very high equal accumulation – similar impacts in immediate surroundings). Probability: Likely, Perhaps, Unlikely, Confidence: Directly or Indirectly combined with the capacity (vulnerability & resilience) of the receiving community to absorb the impact)							

The above matrix aid to avoid risk and be cautious. The impacts considered, is local, permanent and mostly moderate in intensity and likely to have a direct effect. As the impacts are likely and of moderate to low intensity and positive, the risk is low, local and limited to the settlement of Vanrhynsdorp. Due to measures to be applied now and in future these impacts maintain their positive contribution.

The following assumptions and limitations shaped the impact assessment:

Assumptions
This socio-economic impact assumes that:

a) Promoting renewable energy like solar energy, supported by the national and provincial policies is strategically important for South Africa
b) As only one type of land use is required because as sufficient provision is made within Vanrhynsdorp residential settlements for alternative land uses, impacts can be mitigated to be within acceptable levels.
c) All figures for the solar facility was used for the hydrogen facility.
d) All figures for the decommissioning phase are projections based on the construction figures and need verification and benchmarking when this phase has been planned in more detail. However, it is anticipated that the impacts will not differ extensively.

The gaps in current knowledge are as follows:

a) Alternative energy generation can include a variety of activities which is unlikely to be harmful to the environment depending on how waste and decommissioning are handled and managed. Alternative energy generation production for the end user, and in particular solar energy, has less environmental impact than those associated with traditional energy generation. For that reason, zoning laws are more likely to permit solar energy generation near residential areas or on roofs of buildings (O'Sullivan, 2003 adjusted).[1]

   Alternative energy generation require fewer raw materials, space and power. While alternative energy typically causes little pollution, particularly compared to traditional energy generation, some activities (generation of components) can create potentially harmful levels of waste without proper handling.

b) The figures and cost for the hydrogen facility was limited. Hence the figures and costs of the solar facility was applied.

Limitations

a) Assessment of alternatives is limited.
   The alternatives assessed in the Socio- Economic Impact Assessment are limited to the proposed project site and the no-go alternative as the only alternatives.
   Although the Matzikama SDF does not suggest sites or alternatives the location was determined by:
   i. Related infrastructure e.g., substations in relatively close proximity to access opportunities
   ii. The need to establish complementary zonings to integrate land uses and bring work in close proximity to the community

iii. The need for employment opportunities to be in close proximity to Vanrhynsdorp, where lately households in the lower income cohort and whom mainly qualifying for fully subsidized housing, settled.

b) Calculation of the number of jobs created is limited.
The number of jobs created was based on information obtained from the development extent, the developer and very limited figures from specialist reports as the only sources. No other job generation benchmarks were considered.

c) Labour pool location
Number of people employed directly from Vanrhynsdorp in proposed solar and hydrogen facility, is not known. There is no guarantee that most of the employees will be from Vanrhynsdorp. Mitigation could direct employment opportunities to favour inhabitants of Vanrhynsdorp.

d)) Interviews not representative but indicative.
Impacts were assessed through specialist studies and interviews with a number of people, yet not a representative sample (i.e., interested and affected parties, key officials, some community members and business men). These interviews assisted to amplify the issues at hand and provide an overall indication of community concerns.

e) Dated and limited data
The census 2011 data served as a basis for establishing the context of the receiving community. Municipal and other organs of state policies, plans and datasets (such as Socio-economic profiles) were used as additional data sources to inform any projections. Where available, the impact ratings are based on specialist reports available at the time of conducting this assessment.

1.6 Specialist details

The author of this report is an independent specialist with 10 years' experience in the field of rural development, 7 years in community education, 10 years in project management and coordination, 14 years in town and regional planning (Reg. no: A/1369/2010) and 12 years in socio-economic research.

1.7 Declaration of Independence

This is to confirm that Anelia Coetzee, responsible for conducting the study and preparing the Socio-Economic Impact Assessment Report, is independent and has no vested or financial interests in the proposed development being either approved or rejected.

1.8 Report Outline

The report is divided into four sections, namely:

- Section 1: Project Overview & Assessment Scope
- Section 2: Socio- Economic Overview of Study Area and Applicable Legal Context
- Section 3: Assessment of Impacts: Construction, Operations and Decommissioning Phases
- Section 4: Management guidelines to address socio-economic impact.

Section 2: Socio- Economic Overview of Study Area and Applicable Legal Context

This section provides an overview of the baseline socio-economic conditions of the receiving environment and the policy context.

Socio-Economic Overview of Matzikama Local Municipality

Demographics:

In this section, information on population size, composition and structure of the Matzikama Local Municipality will be provided. A caution has to be provided upfront that while the information for the Statistics South African 2016 Community Survey estimates is used, much focus is still on the 2011 Census for well-known reasons.

In 2021, the Matzikama Local Municipality had a total population of 72 759 and this included 21 172 households with an average household size of 3.8 people per household. (Source: Matzikama SEP, 2021).

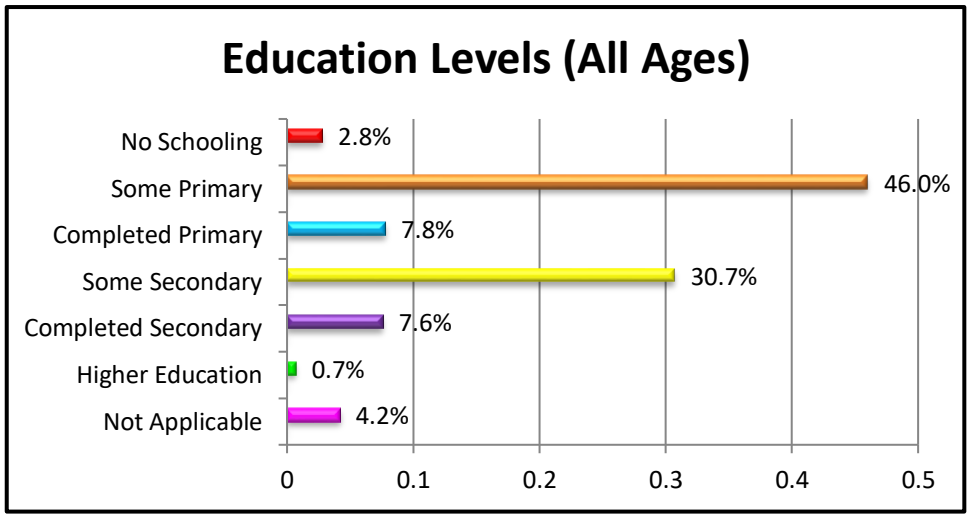
Of a total population of 67 147, in 2011, Vredendal, the main settlement, was home to 18 170 of the total population. Other settlements in the municipality and their population size, are Klawer with 6 234 inhabitants, Lutzville and 5 232 inhabitants and Vanrhynsdorp and 6 272 inhabitants. (Source: Stats SA 2011)

Table: Matzikama Local Municipality Population and Households 2011 (Source: Stats SA 2011)

Year		2011
Population	Total population	67 147
	Population Growth Rate	2.14% (2001-2011)
	15 – 64 years of age	44 921 (66.9%)
Households	Number of households	18 835
	Average household size	3.4
	Female-headed households	5 688 (30.2%)
	Houses owned / paying off	8 589 (45.6%)
	Formal dwelling	16 650 (88.4%)

According to StatsSA2011, 37.5% of households have partners who are married or either living like married partners. Thus, 62.6% of households are single parents according to different variables such as: never married (56.6%), widow/widower (4.2%), separated (0.5%) and divorced (1.3%). The population of the municipal area is quite evenly distributed in terms of gender with 49.9% representing females and 50.1% representing males. The population of Matzikama is relatively young with the Youth (0-14) making up 26.8% of the total population, the Working Age Population (15-64) making up 66.9% of the total population and the Elderly (65+) making up 6.3% of the total population.

Education:



Graph: Highest Educational Level Achieved Matzikama (Source: Stats SA 2011)

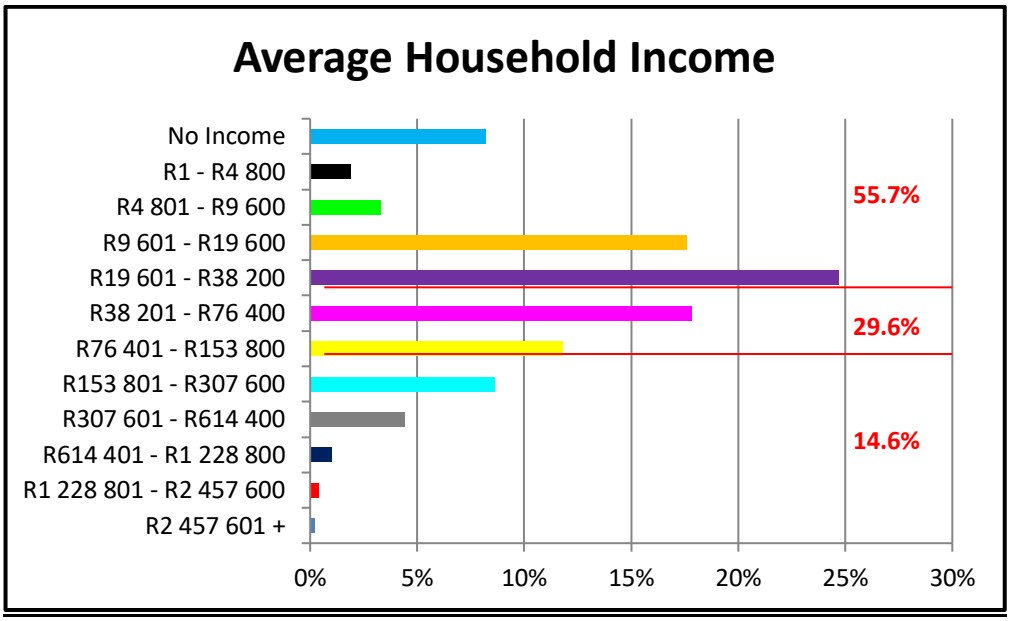
In 2019, Matzikama had a total of 27 schools which decreased to 26 in 2020. A similar trend is noted for no-fee schools, with the number decreasing from 21 in 2019 to 20 in 2020. The leaner enrolment in Matzikama has increased from 10 673 in 2019 to 10 837 in 2020 and then to 10 949 in 2021. The Matric Pass Rates between 2018 and 2021 have been inconsistent with 77.6% being recorded in 2018, 84.5% being recorded in 2019, 82.5% being recorded in 2020 and 83.3% in 2021. When compared with the rest of the West Coast District, Matzikama recorded the second-best pass rate in 2021. Although the Matzikama area had the third highest (72.1%) retention rate in the district in 2020, school drop-outs remain a grave concern. The retention rate increased to 73.5% in 2021. The learner-teacher ratio in 2020 was 29.7 and in 2021 it was 29.0. *(Source: Matzikama SEP, 2021 & MERO West Coast District, 2022-2023)*

According to Stats SA 2011, of those aged 20 years or older, 8.9% have completed primary school, 39.1% have some secondary education, 20.3% have completed matric and 6.9% have some form of higher education.

Education Level	Percentage	Skills Level	Percentage
No Schooling	2.8%	Low Skilled	56.6%
Some Primary	46%	Low Skilled	
Completed Primary	7.8%	Low Skilled	
Some Secondary	30.7%	Semi-Skilled	38.3%
Completed Secondary	7.6%	Semi-Skilled	
Higher Education	0.7%	Skilled	0.7%
Not Applicable	4.2%		

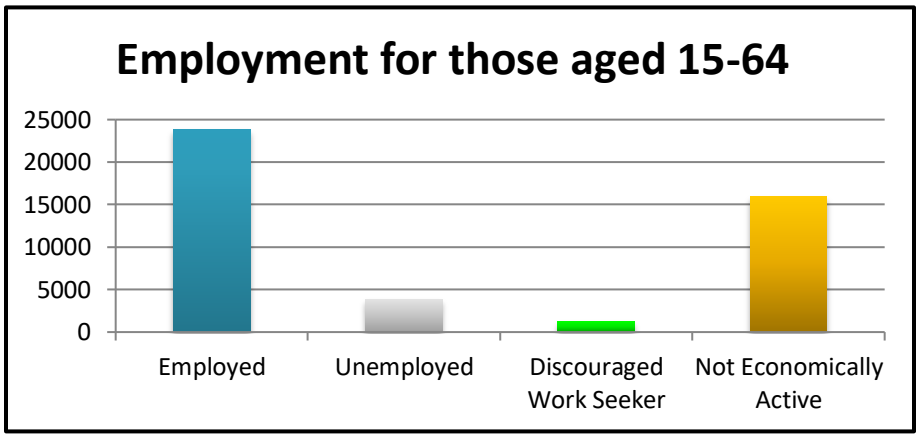
Labour Market:

According to Stats SA, 2011, 55.7% of the households within the municipal are earned less than R3 500 per month and as indigent households, qualify for subsidized housing and free civil and electrical services provision.



Graph: Monthly Household Income Matzikama (Source: Stats SA 2011)

Of the total working age demographic (15-64), 53% fall under Employed, 35.5% fall under Not Economically Active, 8.7% fall under Unemployed and 2.9% fall under Discouraged Work Seeker. Of the youth aged 15-34, 10 679 people are employed and the youth unemployment rate is estimated at 19.3%. The dependency ratio in 2011 was 49.4.



Graph: Matzikama Employment Status of the Working Age Population (Source: Stats SA 2011)

Table: Labour Market Summary Source: Stats SA 2011)

Working Age Population	44 921	100%
Employed	23 806	53%
Not in employment	21 141	47%
Unemployed	3 889	8.7%
Discouraged Work Seeker	1 301	2.9%
Not Economically Active	15 951	35.5%
Unemployment Rate (narrow definition)	5 190	11.7% (2020)
Youth Unemployment Rate		19.3%

There is a total of 21 141 people of the Working Age Population that are not in employment. Of this total, 8.7% or 3 889 people are Unemployed, 2.9% or 1 301 people are Discouraged Work Seekers and 35.5% or 15 951 people are Not Economically Active.

In 2020, there were 26 057 people employed of whom 20.9% were employed in the informal sector and 79.1% were employed in the formal sector. The majority of the formally employed people in the Matzikama municipal area, is low-skilled workers, which represents 41.8% and semi-skilled workers, which represents 24.8% of the total formally employed workforce. The percentage of skilled workers who are formally employed is 12.5%.

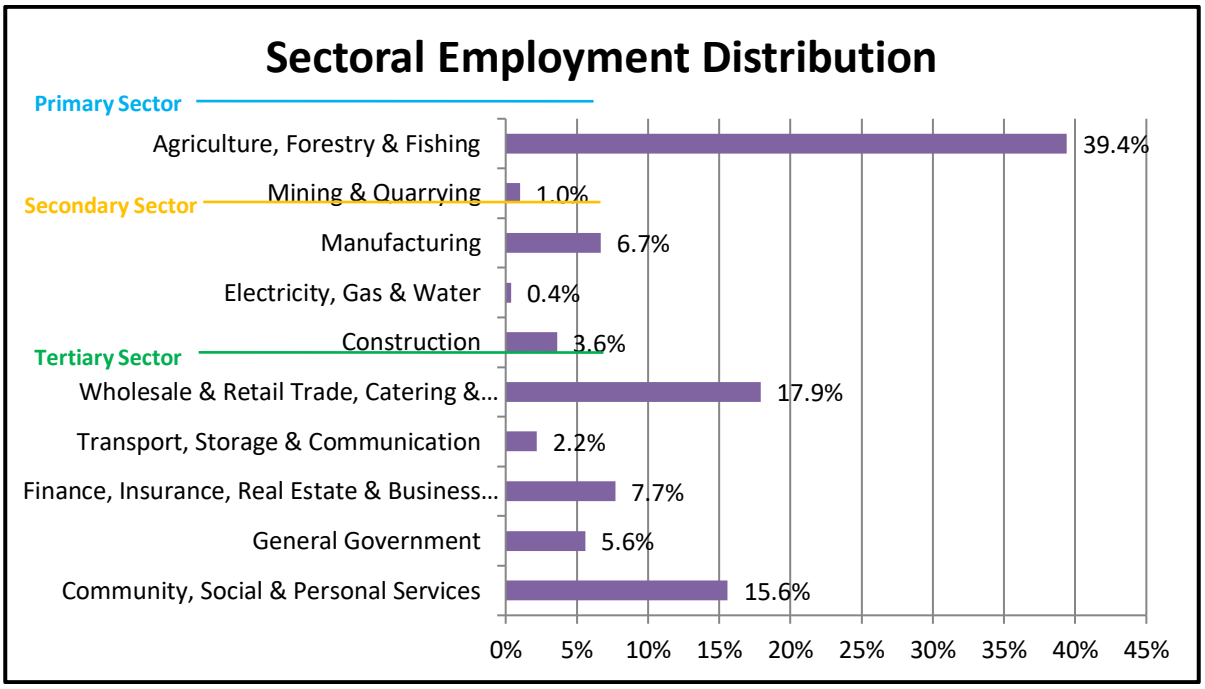
The unemployment rate for Matzikama was 11.7% in 2020 according to the narrow definition of unemployment and include those who wants to work but cannot find work and those who are discourage to look for work, whilst the broad definition includes those who want to work but are not actively seeking employment. It is estimated that unemployment will increase by 2% by 2021. *(Source: MERO West Coast District, 2022-2023)*

The table below reflect the 2011 and estimated 2020 population characteristics of the Labour Market:

	2011 People	**2011 %**	**2020 People**	**2020 %**
Total population	67 147	100%	72 994	100%
Youth (0 – 14)	17 995	26.8%	20 730	28.4%
Working Age Population (15 – 64)	44 921	66.9%	48 468	66.4%
Elderly (65+)	4 230	6.3%	3 796	5.2%
Employed	23 806	53% of Working Age	26 057	53.8% of Working Age
Not economically active	15 951	35.5% of Working Age	19 193	39.6% of Working Age
Unemployed (category only)	3 899	8.7% of Working Age		
Unemployed (narrow definition)	5 190	11.7% of Working Age		

Sector Employment:

In 2020, the Agriculture Sector was the biggest contributor to employment in the Matzikama municipal area with a figure of 39.4%. The second largest contributor was the Trade Sector with a figure of 17.9%. This was followed by the Community Services Sector which contributes about 16.1%, and then the Finance Sector (7.7%), the Manufacturing Sector (6.7%), the General Government Sector (5.6%), the Construction Sector (3.6%), the Transport Sector (2.2%), the Mining Sector (1%) and then the Electricity, Gas and Water Sector (0.4%).



Graph: Sectoral Employment Distribution for Matzikama Local Municipality (Source: MERO, West Coast District, 2022-2023)

In 2020 the Matzikama economy generated a total of 26 057 jobs. Most employees were employed in the tertiary sector (12 745 employees), followed by the primary sector (10 538 employees), and the secondary sector employing 2 774 employees. The agriculture sector employed the majority of workers, with a total of 10 273 employees, followed by the trade (4 658 employees) and community services (4 053 employees) sectors. The average annual change in employment between 2011 and 2020 was 264 jobs. The tertiary sector created 134 jobs annually, whereas the secondary sector created 37 jobs. The primary sector increased jobs by 94 jobs annually between 2011 and 2020, with all jobs created being in the agriculture sector.

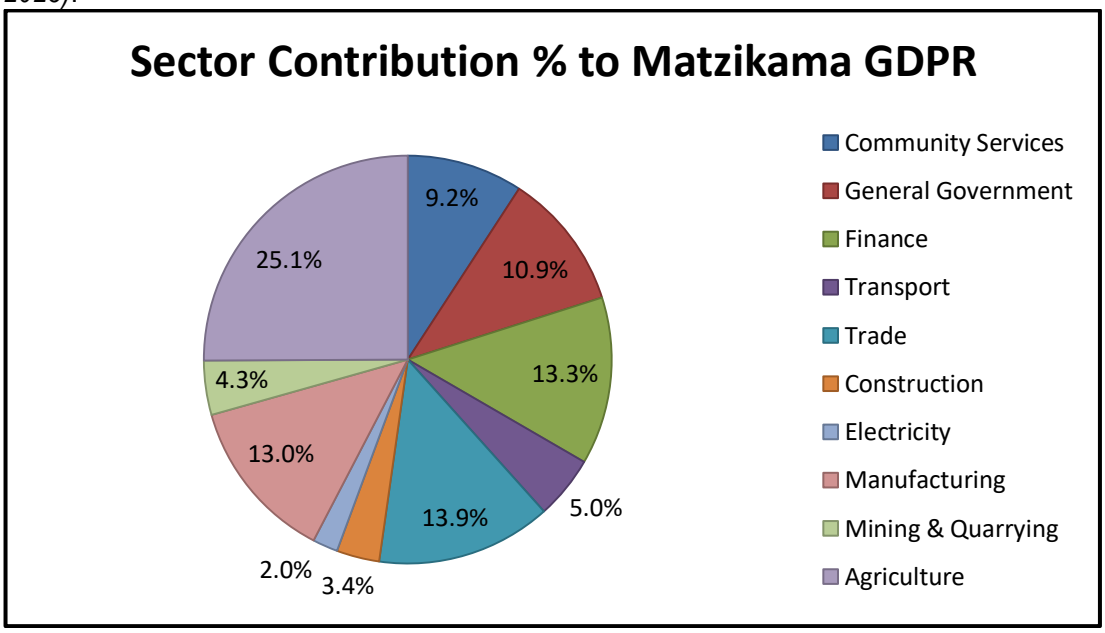
The community services sector as well as the general government sector employed a substantial proportion of skilled (28.5% and 29.4% respectively) people. The finance sector also employed a large proportion of skilled workers (21.5%). The agriculture sector (55.6%), as well as the community services sector (48.5%), employed a large proportion of low-skilled workers. The nature of the work done in these two sectors explains the low level of skills necessary. The transport sector employed the largest proportion of informal workers, most of whom are likely to be the taxi drivers in the municipal area. The trade sector also employed a large percentage (26.6%) of informal workers, which can be linked to the high number of informal traders and vendors across the municipal area. *(Source: MERO West Coast District, 2022-2023)*

Economic Composition:

Economic Sectoral Composition:

In 2020, the Agriculture Sector remained the largest contributor to the Matzikama Local Municipality's GDPR with a figure of 25.1%. The north-eastern part of the municipal area is known for sheep farming, whereas the southern part, mainly Vredendal, is known for wine grapes and raisins. The increase in mutton prices in 2020 contributed to the economic growth experienced by the Agriculture Sector. The tourism sector was severely affected by COVID-19 restrictions and the Trade Sector's contribution contracted immensely but remained the second largest contributor with a figure of 13.9%. This is then followed by the Finance Sector (13.3%), then the Manufacturing Sector (13%), then the General Government Sector (10.9%) and then the Community Services Sector (9.2%). The sectors that contributed the least were: the Transport Sector (5%), the Construction Sector (3.4%) and lastly the Electricity, Gas and Water Sector with 2%.

The Matzikama Local Municipality approximately contributed R5 billion to the GDPR of the West Coast District which makes it the third highest contributor in the district *(Source: MERO, West Coast District, 2022-2023)*.



Economic Sector Distributions to Matzikama GDPR (Source: MERO, West Coast District, 2022-2023)

Economic growth is one of the most important indicators of local livelihood, as it is the primary driver of business development, investment and job creation. The Matzikama Local Municipality experienced a positive economic growth rate of 1.2% per annum between 2011 and 2020. Between 2016 and 2020, the economy of the Matzikama Municipality stagnated, mostly owing to the economic conditions experienced in 2020 across the majority of the sectors as a result of the COVID-19 pandemic. *(Source: MERO, West Coast District, 2022-2023)*.

Access to Basic Services:

According to Stats SA 2011, of the 18 835 households 72.1% receive piped water inside the dwelling, 88.7% have electricity for lighting, 62.1% have flushed toilets connected to sewerage and 67.9% have weekly refuse removal. Of the total households in the municipal area, 88.4% of the total housing is Formal Dwellings.

In 2019, of the total households, 68.4% had their refuse removed weekly, 88.1% had access to electricity for lighting, 96.3% had piped water inside the dwelling and 69% had access to a flush/chemical toilet. *(Source: Matzikama SEP, 2021)*

According to Stats SA 2011, in Matzikama, 39.1% of households own their home and it is fully paid for, 6.6% of households own their home but it is not yet paid off and 25.2% of households rent their homes.

Health and Health Facilities:

In 2020, the Matzikama municipal area had 5 primary healthcare facilities, which comprised of 5 fixed clinics; there were also 13 mobile/satellite clinics, 9 ART clinics. In addition to these primary healthcare facilities, there is also 1 district hospital.

Child Health or the health of new born or children under 5 years of age has experienced an overall decline in numbers from 2019 to 2020:

- The immunization rate increased from 66.4% to 77.7%.
- The number of children malnourished under 5 years (per 100 000) decreased from 2.2 to 1.6.
- Neonatal Mortality Rate (NMR measures the number of deaths within the first 28 days of age per 1000 live births) increased from 9.6 to 11.8.
- Low birth weight indicator (babies born weighing less than 2.5kg) decreased from 16.5% to 13.6%.

Maternal Health numbers in 2020 were as follows:

- Maternal mortality rate (deaths per 100 000 live births) remained at zero deaths.
- The delivery rate of woman under 20 was recorded at 15.5.
- The termination of pregnancy rate remained constant at 0.5%.

(Source: Matzikama SEP, 2021)

Safety and Security:

The number of different criminal offences in 2021 was as follows:

- The number of murders increased from 17 in 2019/20 to 21 in 2020/21.
- The number of sexual offences increased from 100 in 2019/20 to 102 in 2020/21.
- The number of drug-related offences decreased from 502 in 2019/20 to 499 in 2020/21
- The number of cases of driving under the influence of drugs or alcohol decreased from 154 in 2019/20 to 127 in 2020/21.
- The number of residential burglaries increased from 312 in 2019/20 to 373 in 2020/21.

Poverty:

Living conditions (standard of living) are measured by means of indicators including GDP per capita, Income Inequality and Human Development Index (HDI) and this is used to show the current reality of households residing in the Matzikama municipal area based on most recent data by Quantec Research, 2021.

An increase in real GDPR per capita, i.e., GDPR per person, is experienced only if the real economic growth rate exceeds the population growth rate. Even though real GDP per capita reflects changes in the overall well-being of the population, not everyone within an economy will earn the same amount of money as estimated by the real GDPR per capita indicator. At R59 347 in 2020, Matzikama's real GDPR per capita is below that of the West Coast District's figure of R69 251, and below the Western Cape Figure of R84 967.

The National Development Plan (NDP) has set a target of reducing income inequality in South Africa from a Gini coefficient of 0.7 in 2010 to 0.6 by 2030. However, between 2015 and 2020, income inequality has worsened in the Matzikama area, with the Gini-coefficient increasing from 0.56 in 2014 to 0.60 in 2020. Worsening income inequality could also be seen across the West Coast District with 0.57 in 2014 and 0.61 in 2020.

The Human Development Index (HDI) is a composite indicator reflecting on education levels, health, and income. It is a measure of peoples' ability to live a long and healthy life, to communicate, participate in the community and to have sufficient means to be able to afford a decent living. The HDI is represented by a number between 0 and 1, where 1 indicates a high level of human development and 0 represents no human development. The United Nations uses the Human Development Index (HDI) to assess the relative level of socio-economic development within countries. There has been a general increase in the HDI for the Matzikama area, from 0.67 in 2017 to 0.74 in 2020. There has been a similar upward trend for the West Coast District as well as for the Western Cape. *(Source: Matzikama SEP, 2021)*

2.2 Policy and Planning Context

An analysis of the compatibility of the proposed project with the relevant sector policies and development plans concluded that the proposed solar and hydrogen facility is compatible with the following National and Provincial plans and policies:
White Paper on Energy Policy for the RSA (1998);

- White Paper on Renewable Energy (2003);
- National Energy Act (2008);
- National Alternative Energy Strategy (2009);
- National Spatial Development Framework (2006);
- Western Cape Provincial Spatial Development Framework (PSDF), March 2014 revised 2019
- Matzikama Spatial Development Framework;
- Matzikama IDP
- Matzikama Human Settlement Plan;

The proposed development represents a solar and hydrogen facility with amenities and employment opportunities within walking distance from Vanrhynsdorp.

2.2.1 National Level

White Paper on Energy Policy for the RSA (1998)
The White Paper on Energy Policy for South Africa (December 1998) give recognition to "renewable energy sources in their own right; are not limited to small-scale and remote applications, and have significant medium and long-term commercial potential". "Renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future". As South Africa has a very attractive range of renewable resources, particularly solar and wind, the fact that renewable applications are the least costly particularly when social and environmental costs are considered, is strongly emphasized.

The proposed Vanrhynsdorp Solar and Hydrogen Facility is in line with the principles of the White Paper on Energy Policy for South Africa it promotes the use of renewable resources to generate energy.

White Paper on Renewable Energy (2003)
As signatory to the Kyoto Protocol, Government is determined to, by means of the White Paper on Renewable Energy (November, 2003):

a) Make good the country's commitment to reduce greenhouse gas emissions and
b) Ensure energy security through diversification of supply (National Energy Act).

Government's long-term goal is to establish a renewable energy industry that will offer in future sustainable, fully non-subsidized alternatives to fossil fuels. The medium-term (10-year) target set in the White Paper is *10 000 GWh renewable energy contribution to final energy consumption by 2013, to be produced mainly from biomass, wind, solar and small-scale hydro electrical plants.* This target constitutes 4% of the total projected demand. The proposed Vanrhynsdorp Solar and Hydrogen Facility supports government's medium- and

long-term renewable energy goals as it will assist to make good the country's greenhouse gas emissions and ensure energy security.

National Energy Act (2008)

Again, the National Energy Act (Act 34 of 2008) promotes diversification of energy sources and supply including renewable resources, i.e., solar and wind. The diversified energy resources have to be available in sustainable quantities at affordable prices and should support economic growth, poverty alleviation and consider the preservation of the environment.

As the proposed Vanrhynsdorp Solar and Hydrogen Facility enhances energy source diversification, it is thus in line with the National Energy Act.

National Alternative Energy Strategy

South Africa's government has identified around 20GW of pure renewable energy capacity and 4GW of cogeneration technologies that may form part of its renewable energy procurement plan under the region's feed-in tariff programme. Concentrated solar power accounted ten percent (10%) of proposed capacity (Newsnet, 2010). The proposed solar and hydrogen facility contributes to this capacity.

National Spatial Development Framework, 2006 (NSDF)

To National Spatial Development Framework serves as instrument to coordinate all government action and to align social, economic and environmental goals. The National Spatial Development Framework provides the basis to maximize the overall social and economic impact of government development investment through interpreting the strategic direction, policy coordination and combining government action into a continuous spatial framework of reference.

The ultimate goal is to provide basic services, to ameliorate poverty and undo uneven and ineffective spatial patterns and address the additional burden on poor people.

The proposed Vanrhynsdorp Solar and Hydrogen Facility complies with the normative principles of the National Spatial Development Framework as follows:

NSDF Principles	Proposed Vanrhynsdorp Solar and Hydrogen Facility
a) Economic growth is a prerequisite to achieve policy objectives;	The proposed project will contribute positively to the GGP of the province.
b) Government spending on fixed investment should therefore be focused on localities of economic growth or economic potential;	Vredendal and Vanrhynsdorp are earmarked as growth nodes and government spending is earmarked on these localities of economic growth.
c) Efforts to address past and current social inequalities should focus on people not places.	The proposed solar and hydrogen facility create employment and on the job skills development opportunities.
d) To overcome the spatial distortions of apartheid, future settlement and economic development opportunities should be channelled into corridors and nodes that are adjacent to or link the main economic growth centres;	The proposed facility will provide economic development opportunities aligned with being located adjacent to a growth node. Vredendal is the main settlement centre and growth node for

e) Future urban and rural development in the province should change the current pattern of resource application and investment significantly to ensure a sustainable environment for the future. Infrastructure investment and development spending should primarily support localities that will become major growth nodes in South Africa	Matzikama. Vanrhynsdorp was the main settlement and are now replaced by Vredendal.

The proposed solar and hydrogen facility is in line with the principles of the National Spatial Development Framework as it promotes alternative energy generation and is adjacent to Vanrhynsdorp, an economic growth node.

National and Western Cape Policies and Directives

The proposed development supports the following plans and frameworks that give effect to the PSDF:

Table 12: Plans and frameworks supported and given effect to by the PSDF

National Development Plan (NDP) of 2012	Proposed development
- strives to eliminate poverty and reduce inequality by creating jobs and livelihoods, - transform urban spaces, - expand infrastructure, provide capable public services, etc.	Supports the NDP initiative by creating a solar and hydrogen facility in a suitable location maximizing efficient use of infrastructure, creating jobs and livelihoods and transform urban spaces in close proximity.
One Cape 2040	Propose development
Intends • An enabling spatial framework • Integrated neighbourhoods • Healthy and caring living areas • Settlements that address resource scarcity and quality living through design. • Integrated services planning & provision • Mostly low-carbon resource use. Limited toxic use. • Healthy, accessible, liveable, multi-opportunity communities. • Social value capture • High level of local connectivity and global market fluency • High innovation opportunity	Support OneCare vision as it: • Gives effect to the Matzikama SDF without limiting future uses whilst enhancing sustainability. • Integrates complementary land uses: agriculture, residential and utility uses connecting economic and social opportunities. Generates local economic opportunities whilst attracting international investors. • Increases intensification of use in appropriate locations aligned with resources and space economy. • Provides affordable services as existing services are extended. Thus, spatially aligned infrastructure planning, prioritisation and investment. • Creates variety of employment, livelihood and income opportunities in close proximity to residential areas. • Proactively manages economic assets (community resources) i.e., energy/ electricity generation.
Western Cape Infrastructure Framework (2013)	Proposed development
Prioritises	Complies as it • *Makes use of existing services and propose upgrades.*

• Invest in public transport and non-motorised transport (NMT) infrastructure, particularly in larger urban centres • Continue to provide basic services to achieve national targets • Diversify the housing programme • Integrate settlement development, prioritising public service facilities in previously neglected areas • Improve energy efficiency in buildings through design standards • Distribute health and education facilities equitably	• *Can introduce improved energy efficiency in building by means of design standards.*

The proposed solar and hydrogen facility in-turn support the principles of the Provincial Spatial Development Framework (See table and sketch below):

Table 13: Compliance of proposed solar and hydrogen facility with PSDF

A. Western Cape SDF (2014) principles	Proposed development
Policy R1: Protect Biodiversity and Ecosystem services: • Divert urban growth pressures away from critical biodiversity areas	*Proposed development footprint is outside the urban edge of Vanrhynsdorp.* *There is Critical Biodiversity Areas adjacent to the site. The facility can enhance conservation.*
Policy R2: Safeguard inland and coastal water resources, and manage the sustainable use of water: • Given current water deficits, practice 'water wise' planning and design approach • Protect and rehabilitate river systems and high yielding groundwater recharge areas, particularly in areas of intensive land use	*Facility will have its own storm water system that is either re-used or disposed. Storm water run-off will be discharged away from water courses (drainage channels, streams or dams) during construction and* augmented during operations and used as needed.
Policy R3: Safeguard the Western Cape's Agricultural and Mineral resources, and manage their sustainable use: o Reconcile ecosystem requirements with conflicting land development pressures.	*The proposed development will complement the low potential agricultural soil.*
Policy R4: Recycle and recover waste, deliver clean sources of energy to urban consumers, shift from private to public transport, and adapt to mitigate against climate change: o Provide low-income areas with access to electricity and systematically upgrade informal settlements o Avoid developing new residential areas in proximity of agricultural crop spraying o Pursue energy diversification and energy efficiency and delink economic growth from energy use o Support emergent Independent Power Producers o Address climate change mitigation measures in Municipal SDFs	*Operational guidelines should include guidelines and requirements for recycling and recovering of waste;*

○ Encourage and support renewable energy generation at scale	
• **Policy R5: Safeguard cultural and scenic assets:** ○ Include townscape and landscape making considerations into municipal SDF's, land use management systems and infrastructure development programmes ○ Protect heritage and scenic assets from inappropriate development and land use change ○ The delineation of urban edges to safeguard scenery and natural and cultural landscapes	The development is outside the urban edge footprint and along the southern bank of the Droë River. Hence the interface of the proposed solar and hydrogen facility should to be integrated with the surrounding environment and planting a screen of endemic bushes and trees is recommended together with fencing and structures in natural colour and good plant maintenance.
Policy E1: Use regional infrastructure investment to leverage economic growth: • Develop the renewable energy sector • Reduce reliance of transport on liquid fuels • Invest in public transport and non-motorised transport (NMT) infrastructure • Promote denser settlement patterns, reduce the need for travel and create walkable neighbourhoods • Designing human settlements to accommodate infrastructural smart grids	*Job opportunities are provided within walking distance.*
Policy E3: Revitalise and strengthen urban space-economies as the engine of growth: Renewable energy (low job creation potential) – on farms subject to consistency with biodiversity, heritage, scenic and agricultural requirements	Increases intensification of use in appropriate locations aligned with resources and space economy
Policy S1: Protect, manage and enhance the sense of place, cultural and scenic landscape: • Prevent settlement encroachment into viable agricultural areas, scenic landscapes and biodiversity areas • Promote smart growth ensuring efficient use of land and infrastructure, containing urban sprawl and prioritising infill • Enhance an economically, socially and spatially meaningful settlement hierarchy while preserving structural hierarchy of towns, villages, hamlets and farmsteads in relation to historical settlement patterns	*The screen of endemic bushes and trees will integrate into the agricultural surroundings and keep the essence of agricultural production of the area part of the proposed development.* *– The development is outside the urban edge.* *- The development takes place on low potential agricultural soil.* - the infrastructure development enhances settlement hierarchy (service centre) while preserving historical structural hierarchy of Vanrhynsdorp (settlement patterns)
Policy S2: Improve provincial, Inter and Intra-regional accessibility: • Develop human settlement patterns that are compact and accessible so that they can all access the opportunities of urban environments • Built environment projects should focus on compacting and connecting urban development and clustering public facilities along these connections	*– The development will be accessible from the surrounding urban areas as well as regionally.*
Policy S3: Promote compact, industrial and integrated settlements:	

• Secure a more sustainable future settlement plan by means of higher densities and compact settlements save people time and money, • Promote functional integration and industrial as a key component of achieving improved levels of settlement liveability and counter apartheid spatial patterns and decentralization through densification and infill development • Locate and package integrated land development packages, infrastructure and services as critical inputs to business establishment and expansion in places that capture efficiencies associated with agglomeration	– *The solar and hydrogen facility area represents a more intensified use.* More intensified use and compact development design is resources frugal. – Promote solar intensification (and energy reliability) and proximity as a key component of achieving improved levels of settlement liveability. Represents a well-located integrated land development and business development and expansion that capture efficiencies associated with agglomeration such as infrastructure and services.
• **Policy S4: Balance and coordinate the delivery of facilities and social services:** • Balance sustainable service delivery and equitable access to education and health services • Apply the principles of space utilization efficiency, multi-functionality and clustering to all facility provision projects • Ensure that developments take place in a holistic, integrated and sustainable manner, equitable and accessible distribution of social services and facilities is required	— *the solar and hydrogen facility area is accessible via private routes.* Existing social services and amenities is close by (in Vanrhynsdorp).
Policy S5: Promote sustainable, integrated and inclusive housing in formal and informal markets: • Investment in housing ensures optimal and sustainable use of all resources, including financial, land, social and infrastructure components • Provide a wide choice of housing typologies and tenure options, based on economic, fiscal, and social affordability. • Incremental housing development to be pursued, with phased service provision to accelerate housing provision • Provide households with the residential environments, mobility and access to opportunities that support productive activities • Achieve a wider range of housing opportunities and options	*Afford entrepreneurs the opportunity to offer their businesses services.*

2.2.1 Matzikama Spatial Development Framework

The proposed development is located outside the urban edge of Vanrhynsdorp. The locality of the properties is ideal seeing that developable area is along the railway line and directly east of Vanrhynsdorp. Solar and hydrogen facility contributing to achieving sustainable settlements is a main strategy of the SDF and the proposed development follows to establish an integrated, compact, solar and hydrogen facility precinct.

The principles of the Matzikama Spatial Development Framework are supported by the proposed solar and hydrogen facility (See Figure 1 and Table 1):

Table 14: Compliance of proposed solar and hydrogen facility with Matzikama SDF

A. Matzikama SDF (2014) principles	Compliance by proposed solar and hydrogen facility
Walking Distance as the Primary Measure of Access: Appropriate walking distance should always be used as the measure for accessibility. 20 minutes or 1km is regarded as an acceptable distance to walk and should be used as a basis of settlement design.	The proposed renewable energy facility is located slightly further than the prescribed walking distance, yet it is still within walking distance (2 – 3 km along the road) and thus accessible.
Land use integration and interface: The implementation of the walking distance principle to promote greater access to opportunities for all people will require the functional integration of urban activities. At least 50% of urban activities should be within walking distance of where people live	The proposed renewable energy facility is based closest to the labour force that most likely will walk to work.
Socio-Economic Integration: Efforts should be made to locate low-income neighbourhoods nearer to the core or nodes of settlements and away from the periphery	The proposed renewable energy facility is based closest to the labour force that most likely will walk to work.
Intensification Corridors and Linkages: Enhancing the street experience through landscaping and guiding the architecture of new developments	Not applicable.
Sub-centre Nodes: Three levels of hierarchy of urban nodes containing business and community facilities shall be clustered together as far as possible to provide satisfactory access and clustering of activities	Though not part of a sub-centre node, the facility is clustered close to the substation and hence follows the principle of clustering.
Urban Edge: Sufficient protection is given to land requiring protection, inter alia, the agricultural land currently under cultivation	The renewable energy facility is located outside the urban edge, within a transitional zone where infrastructure is likely to be found and is a consent use on agricultural land. Renewable energy facilities are encouraged in buffer areas and agricultural land with low suitability.
Infill, Densification and the Suburbs: It is clear that significant infill and densification is required in order to restructure the settlements in the Municipality. Well located land has been identified to contribute to this important goal.	Not applicable
Wind and Solar Farm Siting Principles: Terrain suitability need to be investigated and should include the following typical aspects in the design process: • Slopes by gradient classes • Rocky areas • Soil type and permeability • Natural watercourses and areas with high water table, Rainfall data; and • Vegetation.	The terrain has been found suitable and comply to the prescribed guidelines.

Infrastructure: To promote sustainable use of natural resources to reduce dependency on conventional grid services, the following are proposed: • Promote the use of solar hot water projects so as to help cross-subsidize infrastructure costs; • Promote use of solar of water heaters, PV panels, grey-water recycling, waste separation at source, and passive building design to as to minimize energy, solid waste and water demand.	The renewable energy facility promotes sustainable use of natural resources and reduced dependency on conventional grid services.
A. Matzikama SDF (2021 -2022) principles	**Compliance by proposed solar and hydrogen facility**
Landscapes that provide resilience to climate change need to be protected and therefore the following areas are important: • Topographically diverse areas, which contain important altitudinal and climate gradients which are important for climate change adaption as well as ensuring a range of micro-climates are protected, • River corridors, which provide important connectivity in arid environments, and • south-facing slopes, which provide refuge habitats. Renewable energy projects e.g., solar and wind farms, need to be promoted in strategic areas to reduce our current dependence on Fossil fuels and also reduce our carbon footprint.	According to the SDF the site is not located in a topographical diverse area, yet it is located on a plain rising 20m above the north of the settlement. It is not in a river corridor but close to a river. The site slopes very slightly from the south-east towards the north-west (direction Droë River). Elevation varies from 151 m (south-east corner) towards the north-west at 145 m with an average slope of 0.7% and an elevation loss of approximately 9 m. Overall, the proposed development complies with the SDF climate change directives.

Ultimately the SDF aims to establish well **performing** settlements and regions within Liveable Environments and Sustainable Settlements Qualities. The proposed solar and hydrogen facility enhances these characteristics.

Section 3: Assessment Impacts

The chapter provides a description of impacts assessed according to standard assessment measures (Addendum A). Impacts are classified firstly according to the environment (as per built environment) they impact upon, the formality of the impact, the unit of people or receptors involved (individual, family or community) and having a direct, indirect, residual or cumulative result.

Table 15: Impact classification Matrix

Environment	Level of Formality	Population unit	Directness
Built Environment (Natural) Social Economic	Informal: Individual & family Life/ Relational/ Social Formal (Regulated): Institutional/ Social	Individual Family Community	Direct Indirect Residual Cumulative

Direct impacts occur as a direct result of an action at the same time **and** location as the action. **Indirect impacts** are reasonably foreseeable **and** occur as a result of an action, but occur later in time or are removed from the action location.

Residual impacts are the result(s) of a project or action, secondary to the main purpose of the project that is nonetheless impacting on the surroundings and the community (https://bizfluent.com, September 2017). Residual Impacts are defined as those impacts that remain following the implementation of mitigation measures (Seagrave Road Environmental Statement Addendum Vol1)

Cumulative Impacts are the **impact** which results from the action when added to other past, present, and reasonably foreseeable future actions which include proposed project activities, other similar activities and unregulated background pressures and trends. The analysis of a project's incremental impacts combined with the effects of other projects can often give a more accurate understanding of the likely results of the project's presence than just considering its impacts in isolation (Business Biodiversity and Offsets Programme (BBOP) 2012). The combined effect of individual impacts occurs when a receptor is affected by more than one impact during any phase of development (Seagrave Road Environmental Statement Addendum Vol1)

The assessment of impacts will be reflected according to the following ratings as per standard assessment measures.

Table 16: Impact rating scale

Rating	Score -	Score +
Low	0 to – 40	0 to 40
Medium	- 41 to – 80	- 41 to 80
High	- 81 to – 120	- 81 to 120
Very High	> - 120	> 120

3.1 Construction Phase:

The construction phase will include the following broad activities:
The construction of civil and electrical infrastructure such as road and bulk services will first take place and followed by the construction of structures and buildings. The construction phase will include the following broad activities to erect the Solar PV panels and electrical reticulation:

Activity	Skills required
1. Prepare site	Fencing, surveying, grading only where required and ground clearance to ensure free flow of surface water underneath the panels.
2. Excavate and install reticulation network	Excavation, trenching, cable laying, concrete work should any be required and electrical assembly of connections with sub-power station and steelwork assembly.
3. Build internal access road	Building road to access (and fire breaks) facility and associated infrastructure and a 5m management single track surrounding each block of photovoltaic arrays: Earthworks (to provide a firm, stable foundation); Installing embankments, levelling, fill, compacting, drainage; Placing gravel on bed before a final series of compactions to reach the desired height; throughout employing soil stabilization and dust control.
4. Install panels	Panels are mounting into a metal frame that is used as structural support for the PV array which are fixed to the ground on a centred or screw pile type foundation.
5. Complete balance of plant	Installing inverters and batteries and site Rehabilitation

The impacts identified, are assessed and mitigation measures are suggested in the section below.

3.1.1 Direct and Positive Impacts during the Construction Phase

a) Employment opportunities increase

Experienced as: Working-age people find employment temporarily and permanently

With an estimated Capital Expenditure of ±R285 million to develop the 10MW and the expected value of construction and employment over ±6 months is ±R40 million. Not less than ±R3.4 million should benefit previously disadvantaged individuals. The number of jobs generated during construction was calculated as thirty (30) persons being employed during the construction period of six (6) months. Of these who does construction work, 56% (or 17 people) are unskilled, 38% (or 11 people) are semi-skilled and 6% (2 people) are skilled. The installation and development contractor are most likely from the Western Cape. These jobs include, but are not limited to site clearing, fencing, general construction work (boxing, concrete mixing and casting), digging trenches, creation of fire breaks and operating the construction vehicles. The no go alternative has no impact on the population of Vanrhynsdorp and its immediate surroundings.

A breakdown of the jobs generated to construct 10MW follows below

No of jobs:	***Duration of contract***	***Skills levels Required***	***Value of employment opportunities/ job cost*** *(6 months)*	***Involvement of locals***

±30	*6 months*	*17 unskilled* *11 semi-skilled* *2 skilled*	*R3.4 million* R1.164 million @ R151000 R1.6 million @ R290 000 R0.48million @ R540 000	*Moderate, locals lack skills required*

The average number of direct jobs the development will create 30 direct jobs for the period of 6 months. Ninety percent (90%) of those jobs should be reserved for locals. Thus, the project will result in an increase of 27 local people employed in the Construction sector which is a secondary economic sector. Of those employed, 15 would be unskilled, 10 would be semi-skilled and 2 would be skilled.

Given the Matzikama municipal trend of employed, unemployed, discouraged work seekers and economically not active people, the same trend should be found in Vanrhynsdorp. In 2011 there were 66.4% (48 468 people) in Matzikama that are of working age, 11.7% (5 190) unemployed and discouraged work seekers and 35.5% (15 951) that are not economically active with the balance (23 806) being employed. In 2020, the number of employed persons increased to 26 057. Of the employed workers, 23.9% were employed in the informal sector and 76.1% were employed in the formal sector.

Though number of employment opportunities represents less than one percent (1%) of the unemployed (5 190 or 11.7%) and the employable population, the number of jobs generated by the proposed solar and hydrogen facility contributes to decrease the unemployment rate, though in the short term.

The intensity of the impact on the local population will be measured according to the following scale:

	Rating	***Low***	***Medium***	***High***
Local Level	Number of jobs as a percentage (%) of employable population (44 921)	0-45 (<1%)	46 – 449 (<10%)	> 449+ (>10%)

The community views and rates *creating jobs* as significant as unemployment in the municipal area are high. The employment of working age people affects the economic environment, as the relationships between people at an individual, family and community level are directly affected.

Environment	**Level Formality**	**Population unit**	**Directness**
Economic	Life/ Relations (Informal)	Individual, family and community	Direct

A summary of the impact follows in the table below.

Table 17: Assessment of impact on employment opportunities: Construction Phase

Impact	***Changes to the economic and material wellbeing of the community as some locals find employment with the contractor.***			
Nature of Impact	*Out of 30 Jobs, 27 jobs will be earmarked for locals. Of those jobs, 17 are unskilled, 10 semi-skilled and 2 skilled jobs.*			
ALTERNATIVES	**Preferred Local**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Short term	1	No impact	0

Probability of occurrence (C)	Probable	2	No impact	0
Intensity of Impact(D)	High positive	3	No impact	0
Degree of confidence (E)	Likely	2	No impact	0
Level of significance (AxBxD+E)XC before Mitigation	Low, positive,	28	No impact	0
Level of significance after Mitigation	Moderate, positive [Highly probable: 3]	42	No mitigation	
Mitigation measures: • Contractor should be required to employ 90% locals of whom 80% is HDIs and are suitably qualified; Should there be a lack of suitably qualified people, skills transfer should be prioritized whilst construction is taking place. • The municipality, local community and community organizations should be informed of the project and potential job opportunities by the developer; • A database of locals including small businesses owned and run by HDIs that qualify as service providers (construction companies, catering companies, waste collection companies, site cleaning companies etc.) should be compiled by the contractor prior to the commencement of the project. These firms should be invited to render services where required; • Establish a Monitoring Committee for the construction phase in collaboration with representatives of the local community. The Monitoring Committee has to ensure that the solar and hydrogen facility is implemented and that any problems that arise and is associated with this phase, is addressed.				
Related results	Influx of contract workers due to lack of skills. Influx of job seekers due to jobs created.			

The increase in the number of jobs is positive, and the significance of the impact is rated low at a local level before and after mitigation. The No go alternative has no impact.

b) Increased Income

Experienced as: Working age person find employment and contribute to household income

The average household income overall is low as 55.7% of the population earns R38 400 (maximum R3 200 per month) and less, whilst 29.6% earns between R38 401 and R153 800 (maximum R12 800 per month) and 14.6% earn more than R12 800 per month:

Annual household income below R38 400	55.7%
Annual household income between R38 401 and R153 800	29.6%
Annual household income above R153 801	14.6%

The construction phase will bring about jobs for some locals that will result in an income for six (6) months. Generally, the income earned would be higher than other contract unskilled and semi-skilled work. The expected value of employment over six months is ±R3.4 million. Not less than ±R3 million should benefit previously disadvantaged individuals.

The increased income affects the economic and social environment and the relationships between family members directly.

Environment	Level Formality	Population unit	Directness
Economic and Social	Life/ Relations (Informal)	Family	Direct

The No-Go alternative will have no impact.

A summary of the impact follows in the table below.

Table 18: Assessment of Impact on income: Construction Phase

Impact	**Some households will experience an increase in income**			
Nature of Impact	The households of the unskilled, semi-skilled locals employed as a result of the proposed development will benefit, as there will be a stable and likely increased income during the construction period.			
ALTERNATIVES	**Preferred Local**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Short term	1	No impact	0
Probability of occurrence (C)	Probable	2	No impact	0
Intensity of Impact(D)	Moderate, positive	2	No impact	0
Degree of confidence (E)	Likely	2	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Low, positive	20	No impact	0
Level of significance after Mitigation	Moderate, positive [Highly Probable: 3]	60	No mitigation	
Mitigation measures: • Developer and contractor to act as reference for locals employed. • Developer and contractor to liaise with existing or future projects to access employment for locals.				
Related results	Those employed will be able to find work on contract sites of similar developments within Cape Winelands and beyond.			

The construction of the proposed solar and hydrogen facility will impact positively on the income of households employed locally and regionally, and the significance of the impact is rated low before and after mitigation. The impact will bring about changes in the economic and material well-being of the local community. The No Go alternative will have no impact.

c) Skills development of working age population

Experienced as: People find employment temporarily and permanently

The skills levels within the Matzikama municipal area are low as in 2011 12.5% of the working age population are skilled, 24.8% are semi-skilled and 41.8% are un-skilled (MERO, 2022 & Stats SA, 2011). The 2011 average household income overall in Matzikama corresponds as 55.7% of the population earns R38 400 (maximum R3 200 per month) and less, whilst 29.6% earns between R 38 401 and R 153 800 (maximum R12 800 per month) and 14.6% earn more than R12 800 per month. These figures broadly correlate with the *Socio Economic Profile* confirming the job categories in 2020: Skilled jobs, 14.5% or 2 997 jobs, semi-skilled jobs, 32.4% or 6 702 jobs and low skilled jobs or 53.1% or 10 980 jobs.

Earns/ skill category	% Income (Stats SA 2011) (a)	% Skill levels (Stats SA 2011) (b)	Income Skills Match (a-b)	% Job category (SEP 2020) (c)	Job Skills Match (a c)
R38 400/ unskilled	55.7	41.8	-13.9	53.1 (10 980)	-2.6
R153 400/ semi-skilled	29.6	24.8	-4.8	32.4 (6 702)	2.8
R153 401/ skilled	14.6	12.5	-2.1	14.5 (2 997)	-0.1

To do the installation of the alternative energy facility and internal services, 90% of those employed should be from the local population. Of note is that 23.9% or 6 477 out of the total number of 27 156 jobs in 2020 was informal. Just more than five thousand (5 190) people or 11.7% of those of working age is unemployed and discouraged work seekers.

Of those forty-five thousand (44 921) people in Matzikama that are of working age, 53% or 23 906 are employed whilst 21 141 are representing those unemployed (8.7% or 3 889) and discouraged work seekers (2.9% 1 301) and not economically active (35.5% or 15 951). Should the workforce be locally recruited, the proposed development contributes to a decreased unemployment rate within the settlement and the municipal area.

	2011 People	**2011 %**	**2020 People**	**2020 %**
Total population	67 147	100%	72 994	100%
Youth (0 – 14)	17 995	26.8%	20 730	28.4%
Working Age Population (15 – 64)	44 921	66.9%	48 468	66.4%
Elderly (65+)	4 230	6.3%	3 796	5.2%
Employed	23 806	53% of Working Age	26 057	53.8% of Working Age
Not economically active	15 951	35.5% of Working Age	19 193	39.6% of Working Age
Unemployed	3 899	8.7% of Working Age		

As education and skills levels in Matzikama region are low, the receiving community may not have the skills required. The skills required to do the installation include general building skills (casting foundations, bricklaying, roofing, guttering, plumbing, electrification and painting, securing construction materials, scaffolding, transportation and logistics and construction management) and rigging skills.

Should formal capacity building and skills development training programmes be implemented, they will benefit the community in the short term and long term. As people get trained their skills level and income will increase and their economic and material well-being will improve. Obtaining skills will enable community members to find work at future construction projects or to do maintenance within the settlement, the municipality and the region. The creation of the opportunity to work and to receive training and skills development will cause more jobseekers to settle in Vanrhynsdorp and immediate surrounding communities. The influx of jobseekers may cause societal tension and instability particularly if the unemployment rates stay high and locals do not find work.

Skills development amongst working age persons affects the economic environment, as the relationships between people at an individual level are directly affected.

Environment	Level Formality	Population unit	Directness
Economic	Life/ Relations (Informal)	Individual	Direct

A summary of the impact follows in the table below.

Table 19: Assessment of Impact on skills and educational qualification levels: Construction Phase

Impact	***Changes in economic and material well-being as the skills base amongst the local population expand and deepen.***			
Nature of Impact	Skills levels and skills capacity in the field of construction and engineering will increase. Those with newly acquired skills may leave the area as new projects in surrounding areas come into being or as outsiders may be employed to do the job. Job seekers joining the community may directly and indirectly cause safety, security and community stability to deteriorate.			
ALTERNATIVES	**Preferred Local**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Short term	1	No impact	0
Probability of occurrence (C)	Probable	2	No impact	0
Intensity of Impact(D)	Moderately positive	2	No impact	0
Degree of confidence (E)	Certain	3	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Low, positive	22	No impact	0
Level of significance after Mitigation	Low positive [Highly Probable: 3]	33		

Mitigation measures:

- Reserve 90% of jobs for local labour.
- Require contractor to put mechanisms in place to enable locals to access jobs offered by the proposed solar and hydrogen facility development.
- Require the contractor to enhance formal and informal skills transfer:

- Should skilled persons from outside the community be employed, the developer should consider implementing a training and skills development programme to enhance the opportunities for local historically disadvantaged individuals in the construction industry. Measures should be put in place to ensure successful training and development i.e., structured job shadowing and learnerships. Such a programme should be offered in liaison with an accredited Further Education and Training College like West Coast College with a satellite in Citrusdal.
- Some basic skills can be tutored at school level in a joint venture established by the developer between the primary schools in Vanrhynsdorp and the schools or education and skills training providers. In the long term (generationally) the improved skills level will ultimately lead to improved levels of education.
- An “access to education support service” assisting future students should be considered attending to application fees for bursaries, career and financial planning and strategies for the period of studying.

- The proposed development should invest in teacher training to offer scarce subjects such as mathematics, science and physical science. Besides investing in teacher training the proposed development should fund the tuition of the scarce subjects.	
Related results	Skills drain in the Municipality as people find work elsewhere. Others are afforded the opportunity to develop their skills instead of locals.

The impact of the skills increase is low positive, and stay low positive after mitigation. Creating skills development opportunities for locals, is viewed significantly positive given the challenge of unemployment in the municipality and in the province. Moreover, skills are a long-term investment.

d) Improved local Economy and Increased Sales

Experienced as: Increase in income

During the construction phase, the general project purchases i.e., most building materials, fuel and domestic purchases, such as groceries, liquor and restaurant services will be purchased locally. This will cause the sales volumes (direct and indirect) to increase. The panels and related equipment will be purchased internationally. The impact on increased international sales is not assessed, as the assessment focused on the local GDP.

It is anticipated that the contribution by the proposed solar and hydrogen facility to the Matzikama Municipality, 2020 GDP of R4 470 million (nearly R5 billion) could be as much as ±R285 million but is unlikely as most of the equipment for the proposed facility will be purchased in imported whilst some of the materials will be purchased in Western Cape province and contribute to its GDP of R 648.82 billion in 2021. (https://tradingeconomics.com/south-africa/gdp-constant-prices, accessed Dec 2022 and Stats SA 2016) However, Matzikama should experience the impact of salaries constituting ±R3.4 million, to establish the solar and hydrogen facility and being spend within the region. The development of the solar and hydrogen facility has a low contribution to the GDP of Matzikama and the increase in sales volume is rated as moderate.

The GDP contribution affects the economy and the community directly.

Environment	Level Formality	Population unit	Directness
Economic	Economy	Community	Direct

A summary of the impact follows in the table below.

Table 20: Assessment of Impact on GGP: Construction Phase

Impact	**Changes in the economic and material well-being**			
Nature of Impact	Direct and indirect sales volumes will increase which will lead to an increase of the GGP of the local and Matzikama regional economy. However, the sale of solar panels and components is highly likely to the benefit the national market and economy.			
ALTERNATIVES	**Preferred**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Short term	1	No impact	0
Probability of occurrence (C)	Probable	2	No impact	0

Intensity of Impact(D)	Moderate, positive	2	No impact	0
Degree of confidence (E)	Likely	2	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Low, positive	20	No impact	0
Level of significance after Mitigation	Low, positive [Highly Probable: 3]	33	No mitigation	
Mitigation measures: • Contractors should be directed by tender criteria to purchase locally and to make use of local service providers. • Spending money locally purchasing from locals and South African should benefit employees. The proposed development should leverage discount in the local economy of the municipal area and employees should be made aware of it. • Small business should be supported (i.e., skills training, assistance and guidance to set up small businesses) and joint ventures with previous disadvantaged persons should be promoted. • The promotion of joint ventures between small business (owned by previous disadvantaged persons) and more established business should be encouraged.				
Related results	None			

The improvement of the economy, measured by the contribution in Gross Domestic/ Geographical Product (GGP) of Matzikama in 2020, reflects as low

The No Go alternative has a low impact.

3.1.2 Direct and Negative Impacts during the Construction Phase

e) Increased use of Social Amenities and Services

Experienced as: Diminishing social amenity and services capacity

Health amenities, i.e., the local clinic, local doctors and regional ambulances will be utilized should a construction-related accident during work or at home happens. It is anticipated that any serious emergencies will be routed to Vredendal, Paarl and Cape Town. However, the likelihood of emergencies on site occurring is unlikely as national safety standards will have to be adhered to.

The temporary stay of the non-local construction team will add negligible pressure on the demand for basic services i.e., water, sewerage and electricity and removing refuse.

Demand for municipal traffic and administrative services may increase on a sporadic basis as abnormal loads have to be transported.

The use of social amenities and services affects the social and the economic environment, as the relationships at community level are directly affected.

Environment	Level Formality	Population unit	Directness
Social and Economic	Life/ Relations (Informal)	Community	Direct

A summary of the impact follows in the table below.

Table 21: Assessment of Impact on services and amenities: Construction Phase

Impact	**Changes in living environment support**			
Nature of Impact	Demand for services may increase slightly and emergency capacity may be required to cope with any construction accidents.			
ALTERNATIVES	**Preferred**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Short term	1	No impact	0
Probability of occurrence (C)	Probable	2	No impact	0
Intensity of Impact (D)	Low negative	-1	No impact	0
Degree of confidence (E)	Likely	2	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Low, negative	-4	No impact	0
Level of significance after Mitigation	Low, negative [Improbable: 1]	-2	No mitigation	
Mitigation measures: • To adhere to international construction, health and safety standards and precaution measures. • To provide health and social training for the project team and in the community which include HIV/AIDs and Covid awareness training.				
Related results				

The impact of the temporary construction team on amenities and municipal serves is low, yet the intensity is negative. After mitigation the probability of the impact becomes less and the level of significance decreases causing the impact to be nearly neutralized. The No Go alternative will have no impact.

f) Increased traffic levels

Experienced as: Motorized and non-motorized traffic levels increase

The construction of the proposed development should be accommodated in the day-to-day traffic. It is unlikely that upgrades will be required as a result of future background traffic volumes following the construction.

During the construction and assembly phase, construction vehicles (graders, TLB's and cement trucks etc.) would be used. These vehicles would stay onsite and their impact on the roads through and surrounding Vanrhynsdorp will be minimal as most of these vehicles will be transported to the site. Vehicles transporting goods, materials and equipment would make use mainly of the N7, R27 and municipal roads and associated gravel and private roads.

The number of truckloads of materials has not as yet been determined but with appropriate scheduling of deliveries the impact can be mitigated.

Construction workers would be transported to site in approximately six vehicles per day, twice a day resulting in maximum of 12 trips per day whilst another 3 – 4 service vehicles will visit the site daily. An average of 15

trips will be generated, constituting an impact of low significance. Although the trip frequency is low, the road surface on the farm on which the site is located is likely to deteriorate and should have to be maintained.

There may be an increase in traffic on foot or non-motorized traffic to reach the site.

The increase in traffic/ decreased safety affects the social environment and the relationship amongst the community indirectly.

Environment	Level Formality	Population unit	Directness
Economic	Life/ Relations (Informal)	Community	Indirect

The slow-moving vehicles (trucks with loads) may impact on road safety on the R27 road running through Vanrhynsdorp. Road signs, erected to address the additional impact of the slow-moving vehicles and employees on foot (pedestrians), will neutralize this impact and conflicts that may arise at junctions to high order roads such as the N7.

A summary of the impact follows in the Table below.

Table 22: Assessment of Impact on Traffic: Construction Phase

Impact	***The increase in heavy and slow traffic may cause changes in the living environment i.e., safety.***			
Nature of Impact	Slow moving and heavy traffic will increase sporadically. The road infrastructure is capable of accommodating the additional traffic caused by construction & delivery vehicles. Road signals will have to be upgraded to decrease conflicting situations and particularly pedestrian safety and at railway line crossings.			
Related impacts	Increased economic opportunity.			
ALTERNATIVES	**Preferred**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Short term	1	No impact	0
Probability of occurrence (C)	Probable	2	No impact	0
Intensity of Impact(D)	Medium, negative	-2	No impact	0
Degree of confidence (E)	Highly Likely	3	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Low, negative	-10	No impact	0
Level of significance after Mitigation	Low, negative [Intensity: Low -1]	-2		
Mitigation measures: • Upgrade road signs to address the movement conflict. • Road signs for protecting pedestrians crossing and accessing the road should be displayed. • Provide transport to decrease pedestrian traffic. • Restrict heavy vehicles to specific hours. • Erect road signs signalling times when heavy vehicles will make use of the road. • Adhere to national traffic safety standards and precaution measures.				

• Contractor/ Implementation agent to provide a traffic safety awareness programme amongst the project team and the community, particularly the kids	
Related results	Increase in pedestrian traffic as more people use the shoulder of the road for mobility purposes (walking & training)

The intensity of the impact caused by the increase of traffic is negative and of low significance. Mitigation measures will assist to decrease in the negative impact to become very low in significance.
The No Go alternative will have no impact.

g) Increased noise and dust levels

Experienced as: Living conditions turn harsher with increased dust and noise.

Noise and dust will be generated during the establishment of the construction site, but only for a limited period of time. Excavation activities for building infrastructure foundations, trenches for cabling and piping may affect the noise and dust levels. After preparation and during the building period noise will be generated by activities such as concrete mixing, construction and transport vehicles to and from the site along gravel roads, building, concrete vibration and steel work, and the installation of services. On-site vehicle movement, delivery of materials and equipment and additional traffic will also create noise. These impacts will be of a local nature, and it is unlikely that Vanrhynsdorp will be affected and if so, only for a limited period of time.

The presence of dust affects the social environment, as individual family members are indirectly affected.

Environment	Level Formality	Population unit	Directness
Social (Health)	Life/ Relations (Informal)	Individuals and families	Direct

A summary of the impact follows in the table below

Table 23: Assessment of Impact on air and audio quality: Construction Phase

Impact	**Changes in the health and social well-being of the local population as noise and dust levels may increase.**			
Nature of Impact	Increases in the dust and noise levels will occur during the entire construction period for short intervals. Dust and noise may impact on the health of employees and inhabitants of Vanrhynsdorp in immediate proximity of the solar and hydrogen facility. Dust and noise suppression can be applied as mitigation measure to maintain the standard of health for employees on site.			
ALTERNATIVES	**Preferred**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Short term	1	No impact	0
Probability of occurrence (C)	Probable	2	No impact	0
Intensity of Impact(D)	Medium, negative	-2	No impact	0
Degree of confidence (E)	Likely	2	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Low, negative	-12	No impact	0

Level of significance after Mitigation	Low, negative [Intensity, low negative: -1]	-4		
Mitigation measures: • Dust creation must be controlled as per construction management and control code. • Noise creation should be controlled as per construction management and control code. • Appoint an Environmental Control Officer to supervise construction and building. • Adhere to the Environmental Management Plan (EMPr) for the Construction Phase. • All workers and management must undergo an induction course. • Enforce strict operating hours for heavy vehicles and construction activities on site to reduce noise and dust impacts on adjacent landowners. • Implementation of dust suppression measures; • Access must be on recognized routes. • Litter and littering must be strictly controlled. • All construction waste and building rubble must be removed off site.				
Related results				

The impact of dust and noise is low negative as it occurs over short intervals and is unlikely to affect the immediate community of Vanrhynsdorp. Mitigation will neutralize the impact as the likelihood of the impact to occur, becomes less.

The No Go alternative has no impact.

h) Change in sense of place

Experienced as: Living environment change

Vanrhynsdorp was regional service centre with a limited economic base, though not in close proximity to the Cape Town markets. It enjoys a high level of mobility with the R27 connecting Cape Town and Gauteng.

The sense of place of Vanrhynsdorp is that of a settlement with a grid layout situated on a low-lying area adjacent the Troe-Troe river, still home to some gravel roads. Travelling towards the settlement on any of the main routes namely N7 highway or local R27, one only becomes aware of the settlement when almost in it. Only approaching from the east on the R27 is the settlement visible from about 5km. From any other approach, the town catchment is less than 2km. The intersection of the R27 and N7 establishes an undefined gateway to the region east and north eastwards. The current land use and the scale and type of infrastructure or physical elements within the immediate area add to the character. The proposed development will represent a change in land use and form and thus the status quo. The sense of place and visual landscape are altered during the construction phase as a result of the infrastructure of the proposed development being introduced onto the dominantly vacant landscape amidst some intensive agricultural cultivation along the river. As the development is situated in the transitional area from urban to natural, where a mix of land uses are typically found, the area does not have a strong sense of place.

The absorption capacity relates to the density of physical elements and topographical variations of the landscape, and the resulting ability of the landscape to absorb elements in the landscape and effectively reduce the visibility of such elements. Although the site is situated away from town, it is still within the immediate surrounding of the town. Infrastructure this close to town is thus not totally foreign. During the construction phase, the proposed development will impact on the sense of place of the surroundings of the settlement given the intrusion on agricultural land and cultivation (fallow land next to some intensive agriculture) being replaced by the assembly of PV arrays (10MW) and the bulky hydrogen plant (10MW), all being approximately ±20ha in extent including support infrastructure comprising approximately 40ha in total. Toward the north in the distance, some mining activity occurs, but it has no direct physical or visual link to the town.

To the north of the town the landscape rises about 20m to form a higher plain. The town has extended onto the plain and the site is located on this plain. Due to this topographical character, the northern section of the town is out of view from the main town. The viewshed is limited due to the topography of the landscape and the absorption rate of the landscape is fairly high. The undulating landscape has a surprisingly high absorption level and due to the low extent, the viewshed is small and restricted. The impact within the viewshed is within acceptable levels of change and the change in land use is of low significance.
The change in the living environment and surroundings is unlikely to affect the social environment and the relationships at a community level indirectly.

Environment	Level Formality	Population unit	Directness
Social	Life/ Relations (Informal)	Community	Indirect

A summary of the impact follows in the table below. Note that the ratings of the visual impact assessment informed the socio-economic assessment and is reflected according to the socio-economic rating scale.

Table 24: Assessment of Impact on appearance & experience of environment: Construction Phase

Impact	**Changes in the quality of the settlement environment**			
Nature of Impact	The visual environment of the area will change as the construction of infrastructure of the proposed development impact to a very limited extent on sensitive receptors such as the N7, R27, the settlement and some nature reserves. The impact is limited by the topography and high absorption rate of the landscape that limits the viewshed. Likely the generation of artificial lighting at night during the construction phase contributes to the limited changed sense of place.			
ALTERNATIVES: Preferred	**Sense of place (Local)**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Short term	1	No impact	0
Probability of occurrence (C)	Definitely Probable	3	No impact	0
Intensity of Impact(D)	Medium, negative	-2	No impact	0
Degree of confidence (E)	Likely	2	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Low, negative	-24		

Level of significance after Mitigation	Low, negative [Intensity, low negative: -1]	-6		
Mitigation measures during the construction phase - Clear all alien vegetation. - Keep disturbed areas to a minimum; - Buildings and similar structures must be in keeping with regional planning policy documents, especially the principles of critical regionalism, namely sense of place, sense of history, sense of nature, sense of craft and sense of limits. - Utilize existing roads and tracks to the maximum extent possible. - Provide pedestrian walkways where desire lines are identified. - Outdoor lighting must be strictly controlled so as to prevent light pollution. - All lighting must be installed at downward angles. - Sources of light must as far as possible be shielded by physical barriers such as trees and buildings or structures. - Use only minimum wattage light fixtures. - Visual management and maintenance: Scheme maintenance covering site tidiness should be maintained at all times including during construction.				
Related result				

The visual and aesthetic sensitivity of the area is moderate and the anticipated impact on scenic resources is low. The construction phase of the solar and hydrogen facility development has a visual impact that is local in extent, medium intensity, definite probability, and of moderate significance on the landscape. The intensity of the visual impact during construction is low negative and stay low negative, yet less so after mitigation.

3.1.3 Indirect Impacts during the Construction Phased

i) Community stability and homogeneousness

Experienced as: Influx of people (employed and unemployed) permanently or semi-permanently looking for work / in anticipation to access employment

The construction phase of the proposed solar and hydrogen facility development will impact on the population of Vanrhynsdorp and its immediate surroundings and cause an influx of skilled people temporarily and permanently as they come to work on the construction site and come to look for work. The influx of people may result in a socially less stable community and higher levels of migration (people staying in Vanrhynsdorp for less than 5 years).

Thirty (30) persons will be employed during the construction phase which lasts six (6) months. The construction contractors will be most likely from the province.

The population influx of Skilled, Semi- and Unskilled People will impact mainly at a local level and affects the social environment, as the relationships between people at an individual level are indirectly affected.

Environment	Level Formality	Population unit	Directness

Social	Life/ Relations (Informal)	Individual	Indirect

A summary of the impact follows in the table below. The rating applied will be project specific.

Table 25: Assessment of Impact on community stability: Construction Phase

Impact effects	**Temporary to permanent increase in the local population;**			
Nature of Impact	The presence of skilled and semi-skilled outsiders will increase the population as different job options are introduced. The influx of skilled and semi-skilled outsiders may affect the migration rate within the settlement and the region.			
ALTERNATIVES	**Preferred**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Short term	1	No impact	0
Probability of occurrence (C)	Highly Probable	3	No impact	0
Intensity of Impact (D)	Low Intensity	-1	No impact	0
Degree of confidence (E)	Likely	2	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Low, negative	-6	No impact	0
Level of significance after mitigation	Low, negative [Highly probable: 3]	-4	No mitigation	
Mitigation measures: • Ensure that the contractor (implementation agent) employ at least 90% locals of whom 80% were previously disadvantaged across all skills categories (unskilled, semi-skilled and skilled). • If not suitably qualified, make an effort to transfer skills on the job. • Involve schools and college to visit construction site to inspire youngsters to join the construction industry. • Establish a Monitoring Committee for the construction phase in collaboration with representatives of the local community. The Monitoring Committee has to ensure that the proposed solar and hydrogen facility is implemented and that any problems that arise and is associated with the demolition of the informal structures and construction phase, is addressed.				
Related results	Different career and job streams are introduced to the local community.			

The influx of skilled and semi- skilled people has a low negative impact locally. However, locals may acquire related skills or follow related careers as different job options are introduced to the local community.

j) Crime and Offences

Experienced as: Prevalence of criminal incidence experienced

The inhabitants of Vanrhynsdorp perceives those common crimes including drug trafficking and use, related sexual offences, theft and drunken driving, most likely will increase during the construction period of the proposed solar and hydrogen facility development given the prevalence of a contractor and increased income amongst some locals.

The prevalence of criminal incidences affects the social environment and individuals, families and the community indirectly.

Environment	Level Formality	Population unit	Directness
Social	Life/ Relations (Informal)	Individual, family and community	Indirect

A summary of the impact follows in the table below. Project specific rating is applied i.e., reversed rating for degree of confidence.

Table 26: Assessment of Impact on safety and security: Construction Phase

Impact	**Immediate and long-term safety and security of the local community.**			
Nature of Impact	Whilst the material well-being of those employed improves, access to money may cause the employed to commit offences. Similarly, the presence of contractors creates the opportunity for criminals to commit crime.			
ALTERNATIVES	**Preferred**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Short term	1	No impact	0
Probability of occurrence (C)	Highly Probable	3	No impact	0
Intensity of Impact (D)	Low, negative	-1	No impact	0
Degree of confidence (E)	Likely	2	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Low, negative	-6	No impact	0
Level of significance after Mitigation	Low, negative [Probable: 2]	-4		
Proposed Mitigation measures: - Regularly alternated twenty-four-hour security to guard the development. - Documentation of all movement and vehicles entering and leaving the premises. - Regular searching of all vehicles entering and leaving the premises. - No persons not concerned with the development to enter on the premises. - Limit access points to one point. - Contractors / developers offer family financial management coaching. - Developers enable contractors to build a Matzikama brand and incentivize employees' successes				
Related results				

The construction of the proposed solar and hydrogen facility may lead to increased offences and crime but after mitigation, the already low impact is nearly neutralized and should not have any long-term consequence.

3.1.4 Residual Impacts during the Construction Phase

k) Youth self-esteem develop

Experienced as: young people find employment temporarily and permanently

Given the high unemployment rate of 11.7% in 2020 there is a need that young people be employed as part of the local component that have to constitute such a project. As the young people may not have the skills, they have little to aspire to and employment is limited to entrance level jobs should they get employed.

The employment of youth affects the social environment, as the relationships between people at an individual level and at a family and community level are indirectly affected.

Environment	Level Formality	Population unit	Directness
Social	Life/ Relations (Informal)	Individual, family and community	Indirect

Job reservation for youth is a mitigation measure to improve the social wellbeing of the community. The application of mitigation measures was considered when employing youth in response to impacts during the Construction Phase. The opportunity afforded to youth to work was assessed as positive. A subsequent impact is that families may start to hold youth in a position of higher esteem than previously. As this view changes positively **family and community life** will be touched and change positively in the long-term breaking the cycle of hopelessness of youth in the local and regional community.

The self-esteem of the youth affects the social environment and the relationship with families and community members indirectly.

Environment	Level Formality	Population unit	Directness
Social	Life/ Relations (Informal)	Individual, family and community	Indirect

A summary of the impact follows in the Table below.

Table 27: Assessment of impact of improved health and social well-being of youth: Construction Phase

Impact	**Youth social well-being improved.**			
Nature of Impact	Young people may lack skills and employment experience and are therefore not afforded an opportunity to be employed by the project. Should young people be employed it may assist to break the cycle of hopelessness. The self-image of the youth improves as well as the way the community views them.			
ALTERNATIVES	**Preferred Local**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Short term	1	No impact	0
Probability of occurrence (C)	Probable	2	No impact	0
Intensity of Impact(D)	Medium, positive	2	No impact	0
Degree of confidence (E)	Likely	2	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Low, positive	20	No impact	0
Level of significance after Mitigation	Moderate, positive [Highly probable: 3]	60		
Mitigation measures:				

• Reserve 60% jobs for youth: Of the 30 jobs generated in the construction period, and the 27 jobs reserved for locals, 18 jobs should be earmarked to be taken up by people 35 years of age and younger. • Require contractor to facilitate mechanisms to enable youth to access employment. • Pay youth market related prices for the job. • Require contractor to facilitate that youth gain equal access to training and education opportunities	
Related results	Decreased teenage addictions and pregnancies. Decreased alcohol abuse Families develop hope.

The improved self-esteem of youth will change their social well-being and in turn change the social well-being of the family. Although the significance of the impact is low, the impact change to moderate significance and positive as it assists to break the local cycle of hopelessness.

The No Go alternative has no impact.

m) Employment equity of vulnerable groups:

Experienced as: Youth and Women find employment temporarily and permanently

Affording youth and women the opportunity to join the workforce, will improve the social well-being of these vulnerable groups. Given the high unemployment rate of 11.7% (in 2020), it is likely that fewer young people will get employed. As the young people may not have many skills, they have little to aspire to and employment is limited to entrance level jobs should they get employed. Of the jobs generated per annum, 60% jobs should be earmarked to be taken up by people younger than 35 years of age and half of these jobs are earmarked to be taken up by women.

The employment of vulnerable groups affects the social environment and the relationship amongst community members indirectly.

Environment	Level Formality	Population unit	Directness
Social	Institutional/ Social	Community and Individual	Indirect

A summary of the impact follows in the Table below.

Table 28: Assessment of impact of employment of vulnerable groups: All Phases

Impact	**Youth and women's social well-being improves, as they find employment.**	
Nature of Impact	Young people and women may lack the skills required and may be excluded from the labour component to be employed at the solar and hydrogen facility development site. Should young people and women be employed it may assist to break the cycle of hopelessness. The self- image of the youth improves as well as the way the community views them. The employment opportunities will enable the families of those employed at the solar and hydrogen facility development site to benefit from their employment. Self-esteem of youth and women will increase.	
ALTERNATIVES	**Preferred**	**No Go**

Extent of impact (A)	Local	4	Status Quo remains	0
Duration of Impact (B)	Short term	1	No impact	0
Probability of occurrence (C)	Probable	2	No impact	0
Intensity of Impact (D)	Medium positive	2	No impact	0
Degree of confidence (E)	Likely	2	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Low, positive	20	Status Quo remains	0
Level of significance after Mitigation	Moderate positive [Highly probable: 3]	60	Status Quo Remain	
Mitigation measures: • Municipality facilitates that youth and women gain equal access to training and education opportunities: Skills development and improvement of educational qualifications should be a project component and youth and women should gain equal access to training and education opportunities. • Reserve 60% of jobs for youth and 40% for women. • Municipality to facilitate access to employment for youth and women. • Pay youth and women market related prices and the same as men for the job.				
Related results	Decreased teenage addictions and pregnancies. Decreased alcohol abuse			

The opportunity afforded to youth and women is positive. The significance of the impact is low before mitigation and change to moderate after mitigation, the change in social wellbeing of youth and women will change the social well-being of their families. After mitigation the significance of the impact becomes moderate. However, the impact is viewed as significantly positive, as it may assist in breaking the cycle of hopelessness within poorer communities.

The No Go alternative has no impact.

3.1.5. Summary of impacts during the Construction Phase and Conclusion

Overall, the construction phase brings about some direct and positive impacts, direct and negative impacts and indirect positive and negative impacts.

Direct and Positive Impacts during the Construction Phase are tabulated below:

Table 29: A summary of direct and positive impacts, Construction Phase

	Impact (s)	*Environment*	*Experienced as*	*Population Unit*	*Rating*	*Mitigated*
A	Employment opportunities increase	Economic:	Working age people find employment temporarily and permanently: 30 Jobs at R3.4 million.	Individual, family and community	Low Positive	Moderate Positive
B	Increased Income	Economic and Social	Working age person find employment and contribute to household income	Family	Low Positive	Moderate Positive

C	Skills development of working age population (6 618)	Economic:	Skills development of those that find employment temporarily and longer term	Individual	Low Positive	Low Positive
D	Improved Local Economy and Increased Sales	Economic	Increased sales and income: <2% contribution to Matzikama GDP	Community	Low, Positive	Low, Positive

Direct and Negative Impacts during the Construction Phase are tabulated below:

Table 30: A summary of direct and negative impacts, Construction Phase

	Impact (s)	***Environment***	***Experienced as***	***Population Unit***	***Rating***	***Mitigated***
E	Increased Use of Social Amenities & Service	Social & Economic	Diminishing social amenity and services capacity	Community	Low Negative	Nearly Neutralized
F	Increased traffic levels	Economic	Motorized and non-motorized traffic levels increase	Community	Low Negative	Low Negative
G	Increased noise & dust levels	Social (Health)	Living conditions turn harsher with increased dust and noise.	Individuals & Family	Low Negative	Neutralized
H	Change in sense of place	Social	Living environment change	Community	Low Negative	Low Negative

Indirect Impacts during the Construction Phase are tabulated below:

Table 31: A summary of indirect impacts, Construction Phase

	Impact (s)	***Environment***	***Experienced as***	***Population Unit***	***Rating***	***Mitigated***
I	Community stability & homogeneous ness	Social	Influx of people (employed and unemployed) permanently or semi-permanently looking for work / in anticipation to access employment	Individual	Low Negative	Low Negative
J	Crime and Offences	Social	Prevalence of criminal incidence experienced	Individuals, family and community	Low Negative	Nearly Neutralized

Residual Impacts during the Construction Phase are tabulated below:

Table 32: A summary of residual impacts, Construction Phase

	Impact (s)	*Environment*	*Experienced as*	*Population Unit*	*Rating*	*Mitigated*
K	Youth's self-esteem develops	Social	Youth people find employment temporarily and permanently	Individual, family and community	Low Positive	Moderate Positive
M	Employment equity of vulnerable groups	Social	Youth and Women find employment temporarily and permanently	Community and Individual	Low Positive	Moderate positive

Overall, the impacts during the Construction Phase are:

The direct positive impacts are:

- The creation of 30 jobs with a wage bill of R3.4 million over 6 months and R3 million benefitting the 27 locals, providing 15 unskilled and 10 semi-skilled and 2 skilled people employment opportunities and contributing <1% to the Vanrhynsdorp GDP;

The Indirect positive impacts are:

- raising awareness of career options having skilled and semi-skilled others present in the community working on the solar and hydrogen facility;

Positive Residual Impacts are:

- improved family coherence as young women are hold in high-esteem (residual impact).

The direct negative impacts are:

- Within limits, though negative, increased use of social amenities and services, decreased road safety and increased noise and dust.
- the change in the sense of place during construction.

Indirect negative impacts:

- Increased crime, which is highly unlikely and

Negative Residual Impacts:

- Youth self-esteem develop
- Employment equity of vulnerable groups

3.2 Operational Phase

During the operational phase, the solar and hydrogen facility has to be maintained and kept clean. The generation of energy is not labour intensive and services will be hired. A total of three (3) contract jobs will be created. Whilst maintenance may occur more sporadically, the facility will be cleaned on average four times a year. A security service will be required daily.

The maintenance and cleaning team will include general workers (cleaners), technicians and a project manager (electrician). Employment contracts, most likely biannual temporary contract, will be offered to those maintaining, cleaning and securing the facility.

The expected current value of the employment for the first ten (10) years is fourteen million rand (R14 million) of which approximately 90% or R13 million rand will benefit previously disadvantaged individuals.

The following impacts during the operational phase are evaluated individually:

3.2.1 Direct and Positive Impacts during the Operational Phase

a) Increased Employment Opportunities

Experienced as: Working age people find employment temporarily and permanently

The generation of energy is not labour intensive and a total of three (3) jobs will be created. Temporary employment contracts will be offered to maintain, clean and secure the facility.

Whilst maintenance may occur more sporadically, the facility will be cleaned on regular intervals. A security service will be required daily.

The maintenance and cleaning team will include general workers (cleaners), technicians and a project manager (electrician). Of those employed, one would be unskilled, one would be semi-skilled and one would be skilled. The local community and the region will benefit from the jobs created. Granting most of the unskilled and semi-skilled jobs to locals will limit the competition with "outsiders" and reduce conflict. The employment of locals would have a consistent positive impact on the economic and material well-being of the local community as the expected value of employment annually is ±R1 million. Of this amount R0.88 million should benefit the local community annually. Employing locals will cause the earnings to flow back into the community and being spent most likely inside the municipal area and region.

Of those forty-five thousand (44 921) people in Matzikama that are of working age, 53% or 23 806 are employed whilst 15 951 are not economically active. Nearly four thousand (3 889) people is unemployed and over a thousand (1 301) discouraged work seekers. The proposed development contributes slightly to decreasing the unemployment rate.

A breakdown of the jobs generated during the operation of the proposed solar and hydrogen facility development follows below:

No of jobs	*Duration contract*	*Skills levels required*	*Value of employment opportunities (10Y)*	*Involvement of locals*

±3 direct	*Annual Contracts*	*1 unskilled, 1 semi-skilled, 1 skilled*	*R3.8 million R3.7 million R6.8 million*	*Approximately 90% of the employees will be local*

The intensity of the impact on the local population will be measured according to the following scale:

	Rating	***Low***	***Medium***	***High***
Local Level	Number of jobs as a % of employable population (44 921)	0-45 (<1%)	46 – 449 (<10%)	> 450+ (>10%)

The impact rates as low as less than 1% of employable people can be employed by the proposed solar and hydrogen facility. However, the community rates creating jobs and improving education as significant given the challenge of unemployment in the municipal area. The skilled jobs are sector related (i.e., engineering) and specialized.

The no go alternative will result in no influx of people and has no impact on the population of Vanrhynsdorp and its immediate surroundings.

The employment of working age people affects the economic environment at an individual, family and community level directly.

Environment	**Level Formality**	**Population unit**	**Directness**
Economics	Life/ Relations	Individual, family and community	Direct

A summary of the impact follows in the Table below.

Table 33: Assessment of impact of job opportunities: Operational Phase

Impact	**Changes to the economic and material well-being of the local community**			
Nature of Impact	Jobs (formal and informal) will be created benefitting locals. Formal jobs will involve contractors whilst the informal jobs will involve entrepreneurs offering services or producing saleable goods.			
ALTERNATIVES	**Preferred Local**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Long term	3	No impact	0
Probability of occurrence (C)	Probable	2	No impact	0
Intensity of Impact (D)	Medium, positive	2	No impact	0
Degree of confidence (E)	Likely	2	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Moderate, positive	52	No impact	0
Level of significance after Mitigation	High, positive [Highly Probable: 3]	78		
Mitigation measures: • Contractors, employing or seeking to employ local HDIs who are suitably qualified, should get preference;				

• The municipality, local community and local community organizations should be informed of the project and potential job opportunities by the developer; • The developer should, where necessary, assist local HDI owned firms to complete and submit the required tender forms on condition that local labour is used; • Skills transfer and development, formally and informally, should be implemented together with local education and skills training providers (e.g., job shadowing).	
Related results	Unemployment levels stay high at local municipal level.

The community perceives job creation as highly positive and the number of jobs created over the entire operational period of 20 years is highly positive, particular after mitigation as locals get employed. The No Go alternative generates no opportunities.

b) Increased Income

Experienced as: Income of families increases as working age people are employed

The 2011 average household income overall in Matzikama and thus similarly in Vanrhynsdorp is low as 55.7% of the population earns R38 400 (maximum R3 200 per month) and less, whilst 29.6% earns between R 38 401 and R 153 800 (maximum R12 800 per month) and 14.6% earn more than R12 800 per month. These figures broadly correlate with the skills levels for the entire Matzikama municipal area as per MERO, 2022 (and Stats SA, 2011): 12.5% skilled, 24.8% semi-skilled and 41.8% unskilled. Again, it broadly correlates with the SEP confirming the job categories in 2020: Skilled jobs, 14.5% or 2 997 jobs, semi-skilled jobs, 32.4% or 6 702 jobs and low skilled jobs or 53.1% or 10 980 jobs.

Earns/ skill category	% Income (Stats SA 2011) (a)	% Skill levels (Stats SA 2011) (b)	Income Skills Match (a-b)	% Job category (SEP 2020) (c)	Job Skills Match (a c)
R38 400/ unskilled	55.7	41.8	-13.9	53.1 (10 980)	-2.6
R153 400/ semi-skilled	29.6	24.8	-4.8	32.4 (6 702)	2.8
R153 401/ skilled	14.6	12.5	-2.1	14.5 (2 997)	-0.1

The expected current value of the employment for the first ten (10) years is R14 million, of which approximately 90% or nearly R13 million will benefit previously disadvantaged individuals. Household members getting employed or getting employed in a better paying job may now have an income or additional income. Overall household income increases.

Increased income of working age people affects the economic environment and the family relationship directly.

Environment	Level Formality	Population unit	Directness
Economic	Life/ Relations	Family	Direct

The No Go alternative will have no impact.

Table 34: Assessment of impact on income: Operational Phase

Impact	**Some households experience an increase in household income**			
Nature of Impact	Member(s) of some households will find employment. As more members per household are employed and members are appointed in better paying jobs, the per capita income of Matzikama and Vanrhynsdorp families will increase.			
ALTERNATIVES	**Preferred Local**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Long term	3	No impact	0
Probability of occurrence (C)	Probable	2	No impact	0
Intensity of Impact (D)	Low, positive	1	No impact	0
Degree of confidence (E)	Likely	2	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Low, positive	28	No impact	0
Level of significance after mitigation	Moderate, positive [Highly Probable: 3]	42	No impact	
Mitigation measures: • Developer, municipality and business owners to liaise with existing or future projects to enhance employment opportunities for locals. • Developer and contractor to act as reference for locals employed.				
Related results	Those employed will be able to find work on contract sites of similar developments within Vanrhynsdorp, Matzikama and its immediate surroundings.			

The operation of the proposed solar and hydrogen facility will impact positively on the income of some households locally as member(s) of these households find employment. The significance of the impact is low and become moderate after mitigation. The No Go option will have no impact.

c) Increased skills levels of working age population and youth in particular

Experienced as: People find employment temporarily and permanently as their employability improve

Should capacity building and skills development training programmes be attended and completed, these programmes, will benefit the community in the short term and long term directly. As people get trained their skills level and income will increase and their economic and material well-being will improve. Not only training will build capacity but work experience will also contribute to skills levels.

Obtaining skills will enable community members to find work within the settlement, the municipality and the region. The creation of the employment opportunities and to attend training and skills development and to get work experience will cause more jobseekers to settle in the Vanrhynsdorp and immediate surrounding communities. This may cause societal tension and instability particularly if the unemployment rates stay high and locals do not find work.

Skills development amongst working age people and youth affects the economic environment and the relationships between individuals and families directly.

Environment	Level Formality	Population unit	Directness
Economic	Life/ Relations (Informal)	Individual and families	Direct

There is not a specific skills development programme proposed other than on the job training.
A summary of the impact follows in the Table below.

Table 35: Assessment of impact of skills development and capacity building: Operational Phase

Impact	**The skills base amongst the local population expands and deepens.**			
Nature of Impact	Employees may be afforded the opportunity to improve skills whilst employed. Skills obtained will be through informal learning.			
ALTERNATIVES	**Preferred Local**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Long term	3	No impact	0
Probability of occurrence (C)	Probable	2	No impact	0
Intensity of Impact (D)	Low positive	1	No impact	0
Degree of confidence (E)	Likely	2	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Low, positive	28	No impact	0
Level of significance after Mitigation	Moderate, positive [Highly Probable: 3]	42		
Mitigation measures: • Reserve 90% of jobs for locals. • Facilitate mechanisms to enable locals to access training opportunities offered by the proposed solar and hydrogen facility. • Require formal and informal skills transfer: Should skilled persons from outside the community be employed, facility owners/ developers should consider implementing a training and skills development programme to enhance the opportunities for local historically disadvantaged individuals in their specific industry. Measures should be put in place to ensure successful training and development i.e., structured job shadowing and learnerships. Such a programme should be offered in liaison with an accredited Further Education and Training College like the West Coast College with a satellite in Citrusdal or a University of Technology.				
Related results	Skills drain in the Municipality as people find work elsewhere. Others are afforded the opportunity to develop their skills instead of locals.			

The impact of the skills increase is low positive, and become moderately positive after mitigation. Creating skills development opportunities for locals, irrespective of its significance, is viewed as significantly positive given the challenge of unemployment in the municipality and in the province. Moreover, skills development is a long-term investment.

The No Go alternative will have no impact.

d) Growth of local economy and Increased Sales

Experienced as: Increase in sales, income and spending

Approximately ±R14 million (expected value of employment during operations over ten years) will be required to maintain the proposed 10MW solar and hydrogen facility established with an estimated Capital Expenditure of ±R285 million. Not less than ±R13 million should benefit previously disadvantaged individuals over ten years or R1 million per annum. Purchase from the income that benefits the locals and regular purchases for the maintenance of the facility most likely will be done within the Matzikama Municipal area or region (West Coast). This will cause the sales volumes (direct and indirect) to increase slightly locally and regionally. Effort should be made to keep the sales in the West Coast and appropriate mitigations measure should be explored.

Intensity of the change in GGP will be rated according to the following scale: Low <1%, Medium 1 -3% and High >3%.

The sale of energy will benefit the local community and the province. It is estimated that electricity to the value of R11.2 million will be sold annually.

The increase in sales volume related to the selling of electricity will contribute to the local GGP. All sales resulting from spending R1 million to operate the plant and selling electricity, will cause a change of less than 1% to the Matzikama GDP (of R4 470 million in 2020).
The increased GGP affects the economy and the community directly.

Environment	Level Formality	Population unit	Directness
Economic	Life/ Relations (Informal)	Community	Direct

A summary of the impact follows in the Table below.

Table 36: Assessment of Impact of GGP: Operational Phase

Impact	**Economic growth and material well-being**			
Nature of Impact	Local GGP will increase. Direct and indirect sales volumes/ spending by employees and vendors will increase which will lead to an increase of the GGP of the local and district economy.			
ALTERNATIVES	**Preferred**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Long term	3	No impact	0
Probability of occurrence (C)	Probable	2	No impact	0
Intensity of Impact(D)	Moderate, positive	2	No impact	0
Degree of confidence (E)	Likely	2	No impact	0
Level of significance (AxBxD+E) x C before Mitigation	Moderate, positive	52	No impact	0
Level of significance after Mitigation	Moderate, positive [Highly probable: 3]	78	No mitigation	
Mitigation measures: • Business should be directed to purchase locally and to make use of local service providers.				

• Spending money locally purchasing from locals and South African should benefit merchants. Any discount leveraged in the local economy of the municipal area should benefit locals • Small business should be supported (i.e., skills training, assistance and guidance to set up small businesses) and joint ventures with previous disadvantaged persons should be promoted. • The promotion of joint ventures between small business (owned by previous disadvantaged persons) and more established business should be encouraged.	
Related results	Increased tertiary economic sector contributions

The improvement of the economy, measured by the change in the 2020 Gross Domestic/ Geographical Product (GGP) of the Matzikama, reflects as moderate.

The No Go alternative has a no impact.

e) Proximate work locations

Experienced as: Employment opportunities are close to where working age people live

The proximity of work adjacent to Vanrhynsdorp enable those of working age to reach work in a shorter time span and to access transport to get to or walk to work. Spending less time and money to get to work is an indirect benefit to individuals and ultimately to families. Walking to work or using non-motorized transport is enhancing individual health and decreasing the carbon footprint of the settlement.

The close proximity of employment opportunities is a formal impact affecting the economic environment of individuals, families and the community directly.

Environment	Level Formality	Population unit	Directness
Economic	Institutional/ Social (formal) – SDF policy	Individual, family and community	Direct

A summary of the impact follows in the Table below.

Table 37: Assessment of impact of work located close to home: Operational Phase

Impact	**Impact of work in close proximity to residences**			
Nature of Impact	The proximity of work adjacent to settlement enable those of working age to reach work in a shorter time span and to easily access transport to get to or walk to work. Reduce carbon footprint of settlement.			
ALTERNATIVES	**Preferred Local**		**No Go**	
Extent of impact (A)	Local	4	Local	4
Duration of Impact (B)	Long term	3	Long term	3
Probability of occurrence (C)	Probable	2	Probable	2
Intensity of Impact(D)	Moderate, positive	2	Medium, Negative	-2
Degree of confidence (E)	Likely	2	Likely	2
Level of significance (AxBxD+E)xC before Mitigation	Moderately, Positive	52	Moderate, Negative	-44
Level of significance after Mitigation	Moderate positive Highly probable: 3	78	No mitigation	No rating
Mitigation measures:				

Ensure that people can reach the site on foot or on none-motorized transport and provide none-motorized track to the site. Indirectly: As per the Matzikama SDF and various specialist reports.	
Related results	Improved standard of living and material well-being

The proximity to work rates moderately positive as it enables SDF policy directives and several other policies and plans.

The no-go alternative rates negative and should not be a consideration.

f) Broadened municipal tax basis

Experienced as: Well-maintained settlement environment

The proposed solar and hydrogen facility development will broaden the Matzikama tax basis as it will open up opportunities for development that contribute to the tax basis. The proposed development will contribute indirectly to liveable environments as the municipality will have the financial capacity to keep settlement precincts intact.

The broadened municipal tax basis is a social impact affecting the economic environment of individuals, families and the community directly.

Environment	Level Formality	Population unit	Directness
Economic	Institutional/ Social (formal)	Family and community	Direct

A summary of the impact follows in the Table below.

Table 38: Assessment of impact of broadened municipal tax base: Operational Phase

Impact	**Broadened municipal tax basis**			
Nature of Impact	Solar and hydrogen facility contributes to and broadens the rates and taxes base of Matzikama Municipality. The taxes enable a well-maintained living environment/ settlement.			
ALTERNATIVES	**Local**		**No Go**	
Extent of impact (A)	Local	4	Local	4
Duration of Impact (B)	Permanent	4	Long term	3
Probability of occurrence (C)	Probable	2	Probable	2
Intensity of Impact(D)	Medium, positive	2	Medium, Negative	-2
Degree of confidence (E)	Likely	2	Likely	2
Level of significance (AxBxD+E)xC before Mitigation	Moderate, positive	68	Moderate, Negative	-44
Level of significance after mitigation	No mitigation		No mitigation	No rating
Mitigation measures: • None				

Related results	Though indirect, the number of indigent households may increase as people are looking for work.

The municipal tax contribution of the proposed solar and hydrogen facility is rated moderately positive and there are no mitigation measures proposed.

The No Go alternative has no impact.

g) Enhanced supply of bulk services

Experienced as: Electricity is generated and distributed

Matzikama Municipality required additional electricity and could consider purchasing the capacity generated by the solar plant. The provision of bulk electricity unlocks business opportunities.

Without the development (No Go alternative), providing bulk electrical service would not have been provided for. Neither would any business opportunities have been unlocked. The No Go alternative should rate moderately negative.

The increased supply of services affects the economic and social environment and the community directly.

Environment	Level Formality	Population unit	Directness
Economic (and Social)	Institutional (Formal)	Individual, family and community	Indirect

A summary of the impact follows in the Table below.

Table 39: Assessment of impact of demand for & provision of services & amenities: Operational Phase

Impact	**Unlocking business opportunities**			
Nature of Impact	Electricity capacity becomes available. The proposed development enables business and commercial development in Vanrhynsdorp and in the Matzikama Municipal area.			
ALTERNATIVES	**Preferred**		**No Go**	
Extent of impact (A)	Local	4	Local	4
Duration of Impact (B)	Permanent	4	Permanent	4
Probability of occurrence (C)	Probable	2	Probable	2
Intensity of Impact (D)	Moderate, positive	2	High negative	-3
Degree of confidence (E)	Likely	2	Likely	2
Level of significance (AxBxD+E)xC before Mitigation	Moderate, positive	68	Highly, negative	-92
Level of significance after Mitigation	High, positive [Intensity, High, positive: 3]	100	No consideration	No rating
Mitigation measures: • Enhancement and enablement of the provision of bulk electrical services for Vanrhynsdorp applying different models.				

• Enhance lobby to obtain commitment from various contributors to finance infrastructure	
Related results	

The impact of the provision of electrical services rates medium positive. As the No Go alternative has a moderate negative impact, the rating of the impact of provision of services changes to highly positive. In essence, the No Go alternative cannot be considered as the proposed development is viewed as a trailblazer project for settlements in future.

3.2.2 Direct and negative impacts during the Operational Phase

h) Change in sense of place

Experienced as: Living environment change

Vanrhynsdorp was regional service centre with a limited economic base, though not in close proximity to the Cape Town markets. It enjoys a high level of mobility with the R27 connecting Cape Town and Gauteng.

The sense of place of Vanrhynsdorp is that of a settlement with a grid layout situated on a low-lying area adjacent the Troe-Troe river, still home to some gravel roads. Travelling towards the settlement on any of the main routes namely N7 highway or local R27, one only becomes aware of the settlement when almost in it. Only approaching from the east on the R27 is the settlement visible from about 5km. From any other approach, the town catchment is less than 2km. The intersection of the R27 and N7 establishes an undefined gateway to the region east and north eastwards. The current land use and the scale and type of infrastructure or physical elements within the immediate area add to the character. The proposed development will represent a change in land use and form and thus the status quo. The sense of place and visual landscape are altered during the operational phase as a result of the infrastructure of the proposed development being introduced onto the dominantly vacant landscape amidst some intensive agricultural cultivation along the river. As the development is situated in the transitional area from urban to natural, where a mix of land uses are typically found, the area does not have a strong sense of place.

The absorption capacity relates to the density of physical elements and topographical variations of the landscape, and the resulting ability of the landscape to absorb elements in the landscape and effectively reduce the visibility of such elements. Although the site is situated away from town, it is still within the immediate surrounding of the town. Infrastructure this close to town is thus not totally foreign. During the operational phase, the proposed development will impact on the sense of place of the surroundings of the settlement given the intrusion on agricultural land and cultivation (fallow land next to some intensive agriculture) being replaced by the assembly of PV arrays and the hydrogen plant (10MW), all being approximately ±20ha in extent including support infrastructure comprising approximately 40ha. Toward the north in the distance, some mining activity occurs, but it has no direct physical or visual link to the town.

To the north of the town the landscape rises about 20m to form a higher plain. The town has extended onto the plain and the site is located on this plain. Due to this topographical character, the northern section of the town is out of view from the main settlement. The viewshed is limited due to the topography of the landscape and the absorption rate of the landscape is fairly high. The undulating landscape has a surprisingly high absorption level (to reduce the visibility of introduced elements) and due to the low extent, the viewshed is small and restricted. The impact within the viewshed is within acceptable levels of change and the change in land use is of low significance.

The change in the living environment is unlikely to affects the social environment and the relationships at a community level indirectly.

Environment	Level Formality	Population unit	Directness
Social	Life/ Relations (Informal)	Community	Indirect

A summary of the impact follows in the table below. Note that the ratings of the visual impact assessment informed the socio-economic assessment and is reflected according to the socio-economic rating scale.

Table 40: Assessment of Impact on appearance & experience of environment: Operational Phase

Impact	**Changes in the quality of the settlement environment**			
Nature of Impact	The visual environment of the area will change as the construction of infrastructure of the proposed development impact to a very limited extent on sensitive receptors such as the N7, R27, the settlement and some nature reserves. The impact is limited by the topography and high absorption rate of the landscape that limits the viewshed. Likely the generation of artificial lighting at night during the construction phase contributes to the limited changed sense of place.			
ALTERNATIVES: Preferred	**Sense of place (Local)**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Long term	3	No impact	0
Probability of occurrence (C)	Probable	2	No impact	0
Intensity of Impact (D)	Medium, negative	-2	No impact	0
Degree of confidence (E)	Likely	2	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Moderate, negative	-44		
Level of significance after Mitigation	Low, negative [Intensity: low negative: -1]	-20		
Mitigation measures during the operational phase - Keep disturbed areas to a minimum; - Buildings and similar structures must be in keeping with regional planning policy documents, especially the principles of critical regionalism, namely sense of place, sense of history, sense of nature, sense of craft and sense of limits. - Utilize existing roads and tracks to the maximum extent possible. - Provide pedestrian walkways where desire lines are identified. - Outdoor lighting must be strictly controlled so as to prevent light pollution. - All lighting must be installed at downward angles.				

- Sources of light must as far as possible be shielded by physical barriers such as trees and buildings or structures. - Use only minimum wattage light fixtures. - Visual management and maintenance: Scheme maintenance covering site tidiness should be maintained at all times including during construction. - Plant a screen of endemic bushes and trees together with fencing in natural colour and good plant maintenance. (Integration of interface of proposed solar and hydrogen facility with surroundings).		
Related result		

The visual and aesthetic sensitivity of the area is low and the anticipated impact on scenic resources is low. The operational phase has a visual impact that is local in extent, long term, medium intensity, definite probability, and of low significance on the landscape. The intensity of the visual impact during operations is low negative and stay low negative, yet less so after mitigation.

The No Go alternative has no impact.

i) Loss of Agricultural Potential and land

Experienced as: Decline in food security potential

The proposed solar and hydrogen facility development site is located on fallow land with low agricultural potential as a result of the dominance of shallow soils with root development restrictions as well as the very low rainfall of the area . The mainly aeolian deposits is often associated with “heuweltjies”. The heuweltjies are characterised by distinct accumulations of calcium carbonate (lime), silica, sepiolite and manganese oxides (Ellis, 2002; Francis, 2007). All these minerals are indicative of arid soil conditions. Due to the distinct spatial variation in lime distribution on such sites the soils vary significantly. In an unprepared state these soils are of low agricultural potential and then only suited to extensive, but managed, grazing.

The total footprint of the facility that excludes agricultural land use has been assessed together with the scale of loss for agricultural production potential of the land at a regional level. Agricultural land occupied by the development infrastructure will become unavailable for agricultural use, with consequent potential loss of agricultural productivity and limited employment. In addition, once the land is returned to agricultural use after decommissioning, the soil can be degraded by erosion and topsoil loss reducing soil potential.

The proposed electrical grid infrastructure has negligible agricultural impact because all agricultural activities that are viable in this environment can continue completely unhindered underneath transmission lines and the on the ground footprint is insignificantly small.

The potential cumulative impact of loss of agricultural land by occupation and degradation and consequent decrease in agricultural production at a regional level, is low given the low potential of the agricultural land. All renewable energy project applications within a 30 km radius are considered, of which there are four renewable energy projects.

The cumulative impact of loss of agricultural land is considered to be within an acceptable limit.

The development will lead to a loss of ±40 hectares that could be cultivated. The proposed solar and hydrogen facility will generate a greater per hectare income for the farming enterprise than what the existing agriculture earn. The renewable energy facility will also generate additional income and employment in the local economy. It will contribute to the country's need for energy generation, particularly renewable energy that has lower environmental and agricultural impact than existing, coal powered energy generation.

The loss of a small part of a larger agricultural enterprise is unlikely to lead to a significant loss of agricultural employment.

The impact is assessed as being of low significance. The conclusion of this assessment is that the proposed development will lead to the loss of ±40 hectares of agricultural land that can be grazed only. The loss is considered to be acceptable.

The loss of agricultural land affects the economic environment and the relationship amongst community members indirectly.

Environment	Level Formality	Population unit	Directness
Economic	Life/ Relations	Community	Indirect

A summary of the impact follows in the Table below.

Table 41: Assessment of impact of the loss of agricultural land: Operational Phase

Impact	**The agricultural potential of the land is diminished when the proposed solar and hydrogen facility development proceed.**			
Nature of Impact	Small yet decreased cultivation opportunities. Decreased food security			
ALTERNATIVES	**Preferred Local**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Long term	3	No impact	0
Probability of occurrence (C)	Highly Probable	3	No impact	0
Intensity of Impact(D)	Low, negative	-1	No impact	0
Degree of confidence (E)	Likely	2	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Low, negative	-30	No impact	0
Level of significance after mitigation	Low, negative: [Probable: 2]	-20	No mitigation	
Mitigation measures: • Implement an effective system of storm water run-off control at any point where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion. • Any occurrences of erosion must be attended to immediately and the integrity of the erosion control system at that point must be amended to prevent further erosion from occurring there. • Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas				

throughout the site, to stabilize disturbed soil against erosion, and to reduce dust formation. • If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface, and then stabilized by facilitating vegetation cover. • Enhance on-site conservation where appropriate. • Indirectly enhance off-site conservation of neighbouring property as critically threatened conservation area. • Enhance conservation tourism.	
Related results	

The loss of agricultural land is of low significance before and after mitigation. Mitigation promotes conservation indirectly and strict storm water management and erosion control directly. The recommended mitigation measures include the implementation of an effective system of storm water run-off control; maintenance of vegetation cover; and stripping, stockpiling and re-spreading of topsoil.

The No Go alternative has no impact.

3.2.3 Indirect Impacts during the Operational Phase

j) Increased levels of education

Experienced as: Enhanced personal choices in the world of work as people gain skills and experience

More inhabitants of Vanrhynsdorp and surroundings will improve their educational qualifications as:

- Those who find employment will gain skills and work experience and will inspire young people to further their studies. As youngsters will take the opportunity to further their studies and it is likely that the matric drop-out rate decreases and the pass rate increases.
- Influx of skilled persons consulting at the proposed development will encourage youth to obtain an education.

The improvement of educational qualifications will enhance personal choices, particularly in the world of work.

Young people confirmed that there is a need to access education in scarce subjects i.e., mathematics, physics and science. The proposed solar and hydrogen facility could undertake to invest 1.5% of its annual revenue into teacher training and support programmes to ensure the offering of scarce subjects. This will result in the improvement of the education and skills levels in Vanrhynsdorp and its immediate surrounding benefitting the community in the long term.

Increased levels of education affect the economic environment and individuals and families directly.

Environment	Level Formality	Population unit	Directness
Social	Life/ Relations	Individual and family	Direct
Economic			Indirect

A summary of the impact follows in the Table below.

Table 42: Assessment of impact of access to education: fewer drop outs: Operational Phase

Impact	**Improved levels of education.**			
Nature of Impact	Changes in the material well-being of generations to come as they are afforded the opportunity to improve their skills. Skills and educational levels in scarce subjects will increase. Enhance personal choices in the world of work.			
ALTERNATIVES	**Preferred Local**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Long term	3	No impact	0
Probability of occurrence (C)	Probable	2	No impact	0
Intensity of Impact (D)	Moderate, positive	2	No impact	0
Degree of confidence (E)	Likely	2	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Moderately, positive	52	No impact	0
Level of significance after Mitigation	Moderately, positive [Highly Probable: 3]	78	No mitigation	
Mitigation measures: • Facilitate mechanisms to enable local young people to access the educational opportunities to attend courses in scarce subjects. • The educational opportunities should include formal and informal education: On successful completion of subjects and courses, opportunities to access further education should be made accessible. • Support school education in scarce subjects.				
Related results	The area will become known for affording locals the opportunity to access education in scarce skills.			

Before and after mitigation, the impact stays moderately positive as educational achievement will be advanced. As people get the opportunity to improve their education, self-development opportunities and income will increase and their economic and material well-being will improve. Young people will experience hope as they main stream into the regional and national economy

The No Go alternative has no impact.

k) Increased SMME participation

Experienced as: Increased economic participation by individual small business owners

Interviews confirmed that there is a need to encourage and support small businesses. Mechanisms should be put in place to enable investment to build small businesses and industries. This will result in the improvement of the local economy in Vanrhynsdorp and its immediate surrounding benefitting the community in the long term.

The change in increased SMME participation affects the economic environment and the relationship amongst individual, families and community members indirectly.

Environment	Level Formality	Population unit	Directness
Economic	Institutional/ Social (formal)	Community	Direct

A summary of the impact follows in the Table below.

Table 43: Assessment of impact of enhancing small businesses: Operational Phase

Impact	**Increased economic participation by individual SMME owners and an increase in number of small businesses**			
Nature of Impact	Small businesses operated by locals increase.			
ALTERNATIVES	**Preferred Local**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Long term	3	No impact	0
Probability of occurrence (C)	Probable	2	No impact	0
Intensity of Impact(D)	Low, positive	1	No impact	0
Degree of confidence (E)	Likely	2	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Low, positive	28	No impact	0
Level of significance after Mitigation	Moderate positive [Highly Probable: 3]	42	No mitigation	
Mitigation measures: • The promotion of joint ventures between small business (owned by previous disadvantaged persons) and more established businesses. • Implement formal small business training and mentoring programmes. • Provide urban space to conduct business. • Establish a mechanism to enable investment into small businesses				

The impact of more small businesses is of low significance before mitigation and change to moderate after mitigation. Where individuals or families do get involved in SMMEs, the impact will be significant for those families.

The No Go alternative has no impact.

3.2.4 Residual Impacts during the Operational Phase

I) Self-esteem and image of youth and women improve

Experienced as: young people find employment temporarily and permanently

An indirect consequence of the dependency rate (i.e., high unemployment (11.7%) and economically not active (35.5%) rate) of 1 dependent per every person working, is enhanced social well-being.

Affording youth and women the opportunity to join the workforce, will improve the social well-being of these vulnerable groups. It is likely that fewer young people with matric will get employed. As the young people may not have many skills, they have little to aspire to and employment is limited to entrance level jobs should

they get employed. The improved self-esteem of the youth (amongst themselves and within the community) and women generated during the construction phase should be extended and strengthened through enhancing their employability in the operational phase. The self-image of women could keep improving by employing women and young women as part of the maintenance team. The impact is evaluated over a 10-year period (long term).

Young women are afforded the opportunity to obtain education in scarce subjects such as mathematics, science and physics. This will enhance women's self-esteem and how the community view young women (Image of young women).

Should no provision be made to break the cycle of poverty, vulnerable persons (i.e., youngsters, disabled, women etc.) will stay part of the household and unemployed. Vulnerable groups earning an income would be able to look after themselves or contribute to the household's finance. Their contribution either enables them to leave the family or to contribute to other family member(s) taking care of other vulnerable persons in the family that cannot work or to employ someone to assist them caring for the family.

The self-esteem of the youth affects the social environment and the relationship with families and community members indirectly.

Environment	Level Formality	Population unit	Directness
Social	Life/ Relations (Informal)	Individual, family and community	Indirect

A summary of the impact follows in the Table below.

Table 44: Assessment of impact of improved health and social well-being of youth: Operational Phase

Impact	**Youth's and women's social well-being improved.**			
Nature of Impact	Youth's and women's improved self-esteem stays intact as they continue to find work within the new precinct.			
ALTERNATIVES	**Preferred Local**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Long term	3	No impact	0
Probability of occurrence (C)	Probable	2	No impact	0
Intensity of Impact(D)	Low, positive	1	No impact	0
Degree of confidence (E)	Likely	2	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Low, positive	28	No impact	0
Level of significance after Mitigation	Moderate, positive [Highly probable: 3]	42		
Mitigation measures: • Reserve a number of jobs for women and youth: 80% jobs (and not less than 60% jobs) should be earmarked for people younger than 35 years of age and half of these jobs for women and vulnerable people. • Facilitate mechanisms to enable women and youth to access employment. • Pay men and women and youth doing the same job, equally. • Ensure that women gain equal access to training and education opportunities that men do.				

• Reserve a number of study opportunities for women. • Put mechanisms in place that vulnerable or unemployed people gain equal access to training and education opportunities: Skills development and improvement of educational qualifications should be a project component and vulnerable people should gain equal access to training and education opportunities.	
Related results	Decreased teenage addictions and pregnancies. Decreased alcohol abuse

The improved self-esteem of youth and women will change their social well-being and in turn change the social well-being of their families. Therefore, the impact is viewed as positive, and changes from low to moderate after mitigation, as it assists to break the local cycle of hopelessness.

The No Go alternative has no impact.

m) Growth in Business Tourism

Experienced as: Economic growth and conservation of threatened vegetation

The N7 and R27 are the main transport routes. The proposed solar and hydrogen facility can serve as a tourism attraction. Tourists, business persons and scholars, locally, nationally and internationally, interested in alternative energy could visit the site. These visitors will support other tourism activities in the region and conservation initiatives with which the generation of alternative energy is broadly aligned. Appropriate infrastructure i.e., walkways, cycle tracks to protect the surroundings should be provided.

As tourism grows, the social environment will be affected and the relationships between community members are indirectly affected.

Environment	Level Formality	Population unit	Directness
Economic	Institutional/ Social (formal)	Community	Direct

A summary of the impact follows in the Table below.

Table 45: Assessment of impact on tourism: Operational Phase

Impact	**Changes in the economic and material well-being**			
Nature of Impact	Tourism (business) can be enhanced. More visitors visit the proposed facility and benefit the local economy.			
ALTERNATIVES	**Preferred Local**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Long term	3	No impact	0
Probability of occurrence (C)	Improbable	1	No impact	0
Intensity of Impact(D)	Moderate, positive	2	No impact	0
Degree of confidence (E)	Likely	3	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Low, positive	27	No impact	0
Level of significance after Mitigation	Moderate, positive [Probable: 3]	54	No mitigation	
Mitigation measures: • Market the solar and hydrogen facility as a tourist destination.				

• Create links with other tourism activities in Vanrhynsdorp through a website and the local tourism office. • Ensure the compilation of a management plan	
Related results	E.

The significance of the impact caused by the proposed solar and hydrogen facility on tourism is of low significance before mitigation and change to moderate significance after mitigation. The No Go alternative has no impact on tourism.

3.2.5. Summary of Impacts during the Operational Phase

Overall, the operational phase brings about some direct and positive impacts, direct and negative impacts and indirect positive and negative impacts.

Direct and Positive Impacts during the Operational Phase are tabulated below:

Table 46: A summary of direct and positive impacts, Operational Phase

	Impact (s)	*Environment*	*Experienced as*	*Population Unit*	*Rating*	*Mitigated*
A	Increased Employment opportunities	Economic	Working age people find employment temporarily and permanently	Individual, family and community	Moderate Positive	High positive
B	Increased Income	Economic	Income of families increases as working age people are employed	Family	Low Positive	Moderate Positive
C	Increased Skills	Economic	People find employment temporarily and permanently as their employability improve	Individual and Families	Low Positive	Moderate Positive
D	Growth of local economy and increased sales	Economic	Increase in sales, income and spending	Community	Moderate Positive	Moderate Positive
E	Proximate work locations	Economic	Employment opportunities are close to where working age people live	Individual, family and community	Moderate Positive	Moderate Positive
F	Broadened municipal tax basis	Economic	Well maintained settlement environment	Family and community	Moderate Positive	No Mitigation

G	Enhanced supply of Bulk Services	Economic (and Social)	Electricity is generated and distributed.	Individual, family and community	Moderate positive	High Positive
H	Change in sense of place	Social	Living environment change	Community	Moderate Negative	Low Negative

Direct and Negative Impacts during the Operational Phase are tabulated below:

Table 47: A summary of direct and negative impacts, Operational Phase

	Impact (s)	*Environment*	*Experienced as*	*Population Unit*	*Rating*	*Mitigated*
I	Loss of Agricultural Potential and Land	Economic	Decline in food security potential	Community	Low Negative	Low Negative

Indirect Impacts during the Operational Phase are tabulated below:

Table 48: A summary of indirect impacts, Operational Phase

	Impact (s)	*Environment*	*Experienced as*	*Population Unit*	*Rating*	*Mitigated*
J	Increased levels of education (Individual development)	Social, Economic	Enhanced personal choices in world of work as people gain skills and experience	Individual and Family	Moderate Positive	Moderate Positive
K	Increased SMME participation	Economic	Increased economic participation by individual small business owners	Community	Low Positive	Moderate Positive

Residual Impacts during the Operational Phase are tabulated below:

Table 49: A summary of residual impacts, Operational Phase

	Impact (s)	***Environment***	***Experienced as***	***Population Unit***	***Rating***	***Mitigated***
L	Self-esteem and image of Youth and women improve	Social	Youth find employment temporarily and permanently	Individual, family and community	Low Positive	Moderate Positive
M	Growth in Business Tourism	Economic	Economic Growth and conservation of threatened vegetation	Community	Low Positive	Moderate Positive

Overall, the impacts during the Operational Phase are:

Direct positive impacts are:

- Increased employment as 3 jobs is generated, and an annual wage bill of R1 million of which R0.88 million is spent locally.
- Increased GDP as a contribution of less than <1% is made by the R1 million wage and maintenance bill and selling R11.2 millions' electricity.
- Proximity to work is <2-3km.
- Municipal tax basis in broadened as taxes is calculated equal to business premises.
- Enhance supply of bulk services as 10MW is generated and 6500 households can be provided with electricity.
- Increased skills as informal training takes place.

Direct negative impacts are:

- Changed sense of place as land use changed.
- Loss of agricultural land whilst conservation and conservation tourism is promoted.

Indirect Impacts are:

- Increased levels of education as personal choices in world of work are enhanced by supporting the teaching scarce school subjects.
- Increased SMME participation as services, including maintenance services is rendered.

Residual Impacts are:

- Youth self-esteem developed and found employment and development opportunities resulted from social investment.
- Employment equity of vulnerable groups improves family relations.
- Family structure changes as family members are becoming available to work.

3.3 Decommissioning Phase

The decommissioning phase will last for 4 months whilst it is estimated that not more than the number of construction workers, i.e., thirty (30) persons, will be employed to demolish the plant. The truckloads of the demolished material to be transported and the materials retained on site have not yet been determined.

3.3.1 Direct and Positive Impacts during the Decommissioning Phase

a) Employment opportunities increase

Experienced as: Working-age people find employment temporarily and permanently

The project will result in an increase of jobs as approximately thirty (30) persons will be employed over a period of approximately 4 months in the decommissioning phase. Approximately seventeen (17) of these jobs will fall in the unskilled and eleven (11) in the semi-skilled categories. These temporary un- and semi-skilled jobs include, but are not limited to site clearing, breaking up fencing, demolition of concrete foundations should any have used, digging trenches to take out cabling and infrastructure. The thirty (30) opportunities equal 9 jobs.

No of job opportunities	***Duration of contract***	***Skills levels***	***Value of employment***	***Involvement of locals***
30	*4 Months*	*17 unskilled, 11 semi-skilled, 2 skilled*	*R2.3 million*	High

Some locals will be recruited to do the unskilled and semi-skilled work during the demolition phase. Skilled labour (i.e., a project manager (a civil engineer) and electricians) is likely to be sourced regionally.

The employment of locals would have a short-term positive impact on the economic and material well-being of the local community as the expected value of jobs created over 4 months is ±R2.3 million. Approximately R2 million should benefit previously disadvantaged individuals.

The intensity of the impact on the local population will be measured according to the following scale:

	Rating	Low	Medium	High
Local level	Number of jobs as a % of employable population (44 921)	0-45 (<1%)	46 – 449 (<10%)	> 450+ (>10%)

The impact intensity rates as low as less than 1% of employable people can be employed by the proposed solar and hydrogen facility. Should only the unemployed be considered, again less than 1% could be employed. However, the community rates creating jobs as highly significant given the challenge of unemployment in the municipal area. However, the short-term nature of the impact keeps the impact low.

A summary of the impact follows in the table below.

Table 50: Assessment of impact on employment opportunities: Decommissioning Phase

Impact	**Changes to the economic and material well-being of locals employed during the decommissioning phase.**			
Nature of Impact	*Out of 30 opportunities, 27 will be earmarked for locals. Of the 30 opportunities, 17 are unskilled, 11 semi-skilled and 2 skilled. The 30 opportunities equal 9 jobs.*			
ALTERNATIVES	**Preferred Local**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Short term	1	No impact	0
Probability of occurrence (C)	Probable	2	No impact	0
Intensity of Impact(D)	Moderate positive	2	No impact	0
Degree of confidence (E)	Likely	2	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Low, positive	20	No impact	0
Level of significance after Mitigation	Low, positive [Highly probable: 3]	30	No mitigation	
Mitigation measures: • Contractor should be required to employ 90% locals of whom 80% is HDIs and are suitably qualified. Should there be a lack of suitably qualified people, skills transfer should be prioritized whilst decommissioning is taking place. • The municipality, local community and community organizations should be informed of the project and potential job opportunities by the decommissioning contractor; • A database of locals including small businesses owned and run by HDIs that qualify as service providers and compiled by the construction contractor prior to the commencement of the project should be used by the decommissioning contractor to invite small businesses to render services where required; • The established Monitoring Committee for the construction phase in collaboration with representatives of the local community, has to ensure that the solar and hydrogen facility is decommissioned and that any problems that arise and is associated with the decommissioning phase, is addressed.				
Related results	Influx of contract workers due to lack of skills. Influx of job seekers due to jobs created.			

The increase in the number of jobs and opportunities is positive, but the significance of the impact is low as the duration of the jobs generated is short term. After mitigation the impact of job opportunity creation does not change. The No go alternative has no impact.

b) Increased Income

Experienced as: Working age person find employment and contribution to household income increases

The 2011 average household income is low as 55.7% of the population earns R38 400 (maximum R3 200 per month) and less, whilst 29.6% earns between R 38 401 and R 153 800 (maximum R12 800 per month) and 14.6% earn more than R12 800 per month.

Annual household income below R38 400	55.7%
Annual household income between R38 401 and R153 800	29.6%
Annual household income above R153 801	14.6%

The 27 out of 30 temporary job opportunities for locals will increase the income of these households. Of the expected that R2.3 million salary bill, R2 million rand will benefit local and previously disadvantaged individuals.

The high unemployment (11.7%/ 5 190 persons) and economically not active (35.5%/ 15 951 persons) rate together with low monthly household income amplifies the income generated by the decommissioning. Households that did not have any income may now have an income or as an additional member of the household is employed, the household income may now increase.

The increased income affects the economic and social environment and the relationships between family members directly.

Environment	Level Formality	Population unit	Directness
Economic and Social	Life/ Relations (Informal)	Family	Indirect

Table 51: Assessment of impact on income: Decommissioning Phase

Impact	**Some households will experience an increase in income**			
Nature of Impact	Some households will experience an increase in income. Member(s) of some households will be employed and benefit as there will be a stable income.			
ALTERNATIVES	**Preferred**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Short term	1	No impact	0
Probability of occurrence (C)	Probable	2	No impact	0
Intensity of Impact(D)	Low, positive	1	No impact	0
Degree of confidence (E)	Likely	2	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Low, positive	12	No impact	0
Level of significance after Mitigation	Low, positive [High Probability: 3]	18	No mitigation	
Mitigation measures: • Developer and contractor to act as reference for locals employed. • Developer and contractor to liaise with existing or future projects to enhance employment opportunities for locals				
Related results				

The decommissioning of the proposed solar and hydrogen facility will impact positively on the income of some households locally although the impact is rated as low. The impact will bring about changes in the economic and material well-being of the local community. The No Go alternative will have no impact.

c) Skills development of working age population

Experienced as: People find employment temporarily

The need for skills within the Matzikama municipal area has been reflected as of the formally employed workers, 12.5% are skilled, 24.8% are semi-skilled and 41.8% are un-skilled. It is unlikely that formal skills training (formal) will take place that benefit the local community during the demolition phase. However, on the job training (informal) may take place.

Skills development amongst working age persons affects the economic environment, as the relationships between people at an individual level are directly affected.

Environment	Level Formality	Population unit	Directness
Economic	Life/ Relations (Informal)	Individual	Direct

A summary of the impact follows in the table below.

Table 52: Assessment of Impact on skills levels: Decommissioning Phase

Impact	**Changes in economic and material well-being of those who obtained skills.**			
Nature of Impact	Skills levels and skills capacity may increase through informal learning. The local community may benefit slightly.			
ALTERNATIVES	**Preferred Local**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Short term	1	No impact	0
Probability of occurrence (C)	Probable	2	No impact	0
Intensity of Impact(D)	Low positive	1	No impact	0
Degree of confidence (E)	Certain	2	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Low, positive	12	No impact	0
Level of significance after Mitigation	Low, positive [Highly Probable: 3]	24		
Mitigation measures: • Require that a number of jobs for local un- and semi-skilled labour get reserved. • Facilitate mechanisms to enable locals to access to the formal learning opportunities during the demolition phase.				
Related results	Others are afforded the opportunity to develop their skills instead of locals.			

The skills increase is positive, but the impact rates low as it may not be offered formally. Creating skills development opportunities for locals, irrespective of its informality, is viewed positive given the challenge of unemployment in the municipality and in the province.

d) Improved local Economy and Increased Sales and GGP

Experienced as: Increase in income

During the demolition phase, the general purchases i.e., fuel and domestic purchases will be made locally in Vanrhynsdorp or Vredendal or Clanwilliam. This will cause the sales volumes (direct and indirect) to increase. The demolition phase will bring about business opportunities for subcontractors and service providers. The recycled plant material will be sold locally and nationally. The increase in sales volume will contribute to the GGP of the Matzikama region.

The total contribution to sales and GDP has not been determined, yet the impact is projected to be low and positive for the Matzikama region and the Western Cape. It is most likely that the contribution will be less than in the construction phase and most likely less than <1%.

The GDP contribution affects the economy and the community directly.

Environment	Level Formality	Population unit	Directness
Economic	Economy	Community	Direct

A summary of the impact follows in the table below.

Table 53: Assessment of Impact on GGP: Decommissioning Phase

Impact	**Changes in the economic and material well-being**			
Nature of Impact	Direct and indirect sales volumes will increase which will lead to an increase of the GGP of the local and regional (Matzikama) economy.			
ALTERNATIVES	**Preferred**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Short term	1	No impact	0
Probability of occurrence (C)	Probable	2	No impact	0
Intensity of Impact(D)	Low, positive	2	No impact	0
Degree of confidence (E)	Likely	2	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Low, positive	20	No impact	0
Level of significance after Mitigation	Low, positive Probability (3)	30	No mitigation	
Mitigation measures: • Decommissioning Contractors should be directed by tender criteria to purchase locally and to make use of local service providers. • Spending money locally purchasing from locals and South African should benefit employees. The proposed development should leverage discount in the local economy of the municipal area and employees should be made aware of it. • Small business should be supported and joint ventures with small businesses owned by previous disadvantaged persons should be promoted.				
Related results	None			

The improvement of the economy, measured by the change in Gross Domestic/ Geographical Product (GGP) of Matzikama should reflect most likely as low measured against the 2019 GDP.

The No Go alternative has a low impact.

3.3.2 Direct and Negative Impacts during the Decommissioning Phase

e) Increased use of Social Amenities and Services

Experienced as: Diminishing social amenity and services capacity

Health amenities, such as clinics, local doctors and ambulances will be utilized should a demolition related accident happens. Vanrhynsdorp has limited facilities. It is anticipated that there is sufficient capacity in Clanwilliam, Citrusdal or Paarl and Cape Town to handle emergencies or to route such emergencies to Cape Town. Demolition related accidents may in the short-term, place additional pressure on the existing emergency facilities. However, the likelihood of emergencies occurring is unlikely as national safety standard will have to be adhered to.

The use of social amenities and services affects the social and the economic environment, as the relationships at community level are directly affected.

Environment	Level Formality	Population unit	Directness
Social and Economic	Life/ Relations (Informal)	Community	Direct

A summary of the impact follows in the table below.

Table 54: Assessment of Impact on services and amenities: Decommissioning Phase

Impact	**Pressure on existing amenities may increase temporarily**			
Nature of Impact	Demand for services may increase slightly and emergency capacity may be required to cope with any decommissioning accidents. .			
ALTERNATIVES	**Preferred**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Short term	1	No impact	0
Probability of occurrence (C)	Probable	2	No impact	0
Intensity of Impact(D)	Low negative	-1	No impact	0
Degree of confidence (E)	Likely	2	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Low, negative	-4	No impact	0
Level of significance after Mitigation	Improbable: 1	-2	No mitigation	
Mitigation measures: • To adhere to international construction, health and safety standards and precaution measures.				
Related results	.			

The impact of the temporary decommissioning team on amenities and municipal serves is low, yet the intensity is negative. After mitigation the probability of the impact becomes less and the level of significance decreases causing the impact to be nearly neutralized. The No Go alternative will have no impact.

f) Increased traffic levels

Experienced as: Motorized and non-motorized traffic levels increase

During the demolition phase, demolition vehicles (TLB's, trucks and a site crane) would be used. Some of these vehicles would stay onsite and some will be used to transport the demolished material. Vehicles transporting demolished materials and equipment would make use of the R27 and N7.

The number of truckloads of materials has not as yet been determined but with appropriate scheduling of removal of loads, the impact can be mitigated.

Demolition workers would be transported to site in approximately six vehicles per day, twice a day resulting in maximum of 12 trips per day whilst another 3 – 4 service vehicles will visit the site daily. An average of 15 trips will be generated, constituting an impact of low significance. Although the trip frequency is low, the road surface on the farm on which the site is located is likely to deteriorate and should have to be maintained as the practice was during the operational phase.

There may be an increase in traffic on foot or non-motorized traffic to reach the site.

The increase in traffic/ decreased safety affects the social environment and the relationship amongst the community indirectly.

Environment	Level Formality	Population unit	Directness
Social	Life/ Relations (Informal)	Community	Indirect

The slow-moving vehicles (trucks with loads) may impact on road safety on the intersection of the R27 and the N7. Road signs, erected to address the additional impact of the slow-moving vehicles and employees on foot (pedestrians), will neutralize this impact and conflicts that may arise at the railway line crossings and junctions to these high order roads.

A summary of the impact follows in the Table below.

Table 55: Assessment of Impact on Traffic: Decommissioning Phase

Impact	***The increase in heavy and slow traffic may cause changes in the living environment i.e., safety.***			
Nature of Impact	Slow moving and heavy traffic will increase. The road infrastructure is capable of accommodating the additional traffic cause by construction vehicles with regular maintenance to keep up the road surface and safety. Road signals will have to be upgraded to decrease conflicting situations and particular pedestrian safety and at railway line crossings.			
Related impacts	Increased economic opportunity.			
ALTERNATIVES	**Preferred**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Short term	1	No impact	0

Probability of occurrence (C)	Probable	2	No impact	0
Intensity of Impact(D)	Medium, negative	-2	No impact	0
Degree of confidence (E)	Highly Likely	3	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Low, negative	-10	No impact	0
Level of significance after Mitigation	Intensity: Low -1	-2		

Mitigation measures:

- Upgrade road signs to address the movement conflict.
- Rehabilitate the gravel road during and particularly after demolition to at least the same standard as is currently.
- Upgrade road signs to address the movement conflict.
- Road signs for protecting pedestrians crossing and accessing the road shoulder should be displayed.
- Provide transport to decrease pedestrian traffic.
- Restrict heavy vehicles to specific hours.
- Erect road signs signalling times when heavy vehicles will make use of the road.
- Adhere to national traffic safety standards and precaution measures.

Related results	Increase in pedestrian traffic as more people use the shoulder of the road for mobility purposes (walking & training).

The intensity of the impact caused by the increase of traffic is negative and of low significance. Mitigation measures will change the negative impact to become very low in significance.

The No Go alternative will have no impact.

g) Increased noise and dust levels

Experienced as: Living conditions turn harsh with increased dust and noise.

Dust and noise will be generated during the demolition of the facility for a limited period of time. Demolition activities such as taking down the solar panels and pedestals, breaking up the foundations and taking out the cabling and piping may affect the noise and dust levels for a limited time. On-site vehicle movement, removal of materials and equipment will also create noise. These impacts will be of a local nature and for a limited period of time and it is unlikely that Vanrhynsdorp will be affected and if so, only for a limited period of time.

The presence of dust affects the social environment, as individual family members are indirectly affected.

Environment	Level Formality	Population unit	Directness
Social (Health)	Life/ Relations (Informal)	Individuals and families	Direct

A summary of the impact follows in the table below

Table 56: Assessment of Impact on air and audio quality: Decommissioning Phase

Impact	**Changes in the health and social well-being of the local population as noise and dust levels may increase.**			
Nature of Impact	Increases in the dust and noise levels may occur during the entire demolition period for short intervals. Dust and noise may impact on the health of employees and inhabitants of Vanrhynsdorp in immediate proximity of the solar and hydrogen facility. Dust and noise suppression can be applied as mitigation measure to maintain the standard of health for employees on site.			
ALTERNATIVES	**Preferred**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Short term	1	No impact	0
Probability of occurrence (C)	Probable	2	No impact	0
Intensity of Impact(D)	Medium, negative	-2	No impact	0
Degree of confidence (E)	Likely	2	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Low, negative	-12	No impact	0
Level of significance after Mitigation	Low, negative [Low intensity, negative: -1]	-4		
Mitigation measures: • Dust creation must be controlled as per construction management and control code. • Noise creation should be controlled as per construction management and control code. • Appoint an Environmental Control Officer to supervise decommissioning. • Adhere to the Environmental Management Plan (EMPr) for the decommissioning Phase. • All workers and management must undergo an induction session. • Enforce strict operating hours for heavy vehicles and demolition activities on site to reduce noise and dust impacts on adjacent landowners. • Implementation of dust suppression measures; • Access must be on recognized routes. • Litter and littering must be strictly controlled. • All demolition waste and building rubble must be removed off site.				
Related results				

The impact of dust and noise is low negative as it occurs over short intervals and will affect the immediate community of Vanrhynsdorp. Mitigation will neutralize the impact as the likelihood of the impact to occur, becomes less.

The No Go alternative has no impact.

h) Change in sense of place

Experienced as: Living environment change

During the decommissioning phase, the site should be returned to as near as its pre-development visual state as is possible and all waste material should be removed from the site. The sense of place should be

restored to before the proposed solar and hydrogen facility has been constructed. This would likely impact positively on the site.

The change in the living environmental affects the social environment and the relationships at a community level indirectly.

Environment	Level Formality	Population unit	Directness
Social	Life/ Relations (Informal)	Community	Indirect

A summary of the impact follows in the table below. Note that the ratings of the visual impact assessment informed the socio-economic assessment and is reflected according to the socio-economic rating scale.

Table 57: Assessment of Impact on appearance & experience of environment: Decommissioning Phase

Impact	***Reinstating the quality of the settlement environment* to as before the establishment of the solar and hydrogen facility**			
Nature of Impact	As the solar and hydrogen facility will be demolished, the reversed sense of place to before the solar and hydrogen facility was established, will be experienced.			
ALTERNATIVES: Preferred	***Sense of place (Local)***		***No Go***	
Extent of impact (A)	*Local*	4	*No impact*	*0*
Duration of Impact (B)	*Short term*	1	*No impact*	*0*
Probability of occurrence (C)	*Probable*	2	*No impact*	*0*
Intensity of Impact(D)	*Highly, Positive*	3	*No impact*	*0*
Degree of confidence (E)	*Likely*	2	*No impact*	*0*
Level of significance (AxBxD+E)xC before Mitigation	*Low, Positive*	28		
Level of significance after Mitigation	*Moderate, Positive [Highly Probable: 3]*	*42*	*No mitigation*	

Mitigation measures:
• Prepare a decommissioning plan to establish a timeframe and order of decommissioning and rehabilitation of the plant.
• During demolition the site should be returned to as near as its existing state as is possible.
• All waste material has to be removed.
  • Removal of all infrastructure introduced into the landscape (i.e., PV panels, ancillary infrastructure such as a maintenance workshop, storage building and offices).
  • Rehabilitate all new access roads created during the construction period.
  • Institute monitoring of all decommissioned and rehabilitated sections of the project site at regular intervals.				

Related result				

The restoration of the site to its former state and sense of place is rated as low positive and change to moderately positive should mitigation measures be applied. The No Go alternative has no impact.

i) Retrenchments

Experienced as: Loss of income.

The three (3) project maintenance staff will be retrenched as their contracts will not be renewed. These retrenched persons may not be able to find work within the immediate community or in the region. These households will experience a decrease in income as it is likely that their family members may not find employment.

The retrenchment of employees impacts mainly at a local level and affects the social environment, as the relationships between people at a family level are indirectly affected.

Environment	Level Formality	Population unit	Directness
Social	Life/ Relations (Informal)	Individual	Indirect

A summary of the impact follows in the table below.

Table 58: Assessment of Impact on employment: Decommissioning Phase

Impact effects	**Changes to the economic and material well-being of the Community**			
Nature of Impact	Households may experience a decrease in income as no contracts will be offered. Unemployment may increase.			
ALTERNATIVES	**Preferred**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Long term	3	No impact	0
Probability of occurrence (C)	Probable	2	No impact	0
Intensity of Impact(D)	High negative	-3	No impact	0
Degree of confidence (E)	Likely	2	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Moderate, negative	-68	No impact	0
Level of significance after mitigation	Moderate, negative [Intensity: Moderate negative:-2]	-44	No mitigation	
Mitigation measures: • Ensure that the decommission contractor employ at least 90% locals of whom 80% were previously disadvantaged and across at least two skills categories (unskilled, semi-skilled and skilled). • If not suitably qualified, ensure transfer skills on the job. • The established Monitoring Committee for the construction and demolition phases in collaboration with representatives of the local community, has to ensure that the solar and hydrogen facility is decommissioned and that any problems that arise and is associated with the decommissioning phase, is addressed.				
Related results				

The decreased number of jobs is moderately negative and mitigating the intensity decreases the impact slightly. The No Go alternative will have no impact.

j) Social benefits ceased

Experienced as: Individual achievement and development benefits the Vanrhynsdorp community

The social contribution of the proposed project during operations will cease as well as the benefit the local and regional community enjoyed from the social investment fund. The impact thereof, no funding, is likely to be experienced with an increase of intensity over the next three to five years (medium term) from when the operations ceased.

The offering of subjects in scarce disciplines (i.e., mathematics, science, physics and technology education and training) as the social contribution of the proposed solar and hydrogen facility will come to an end, may cease depending on what provision was made to maintain such training.

The support to small businesses and skills development of entrepreneurs will cease.

The lack of development opportunities for community members that cannot afford it affects the social environment and individuals, families and the community directly.

Environment	Level Formality	Population unit	Directness
Social	Life/ Relations (Informal)	Individual, family and community	Directly

A summary of the impact follows in Table below.

Table 59: Assessment of Impact on social investment ceasing: Decommissioning Phase

Impact	**Changes in the educational levels and skills of the community and in the long term their economic and material well-being**			
Nature of Impact	The development and support programme for teachers will come to an end. Over a period of time the offering of scarce subject may become a challenge once again as teachers are no longer supported. The support and entrepreneurial skills training will come to an end. Over the long-term support to small business may suffer and cease.			
ALTERNATIVES	**Preferred**		**No Go**	
Extent of impact (A)	Local	4	No impact	0
Duration of Impact (B)	Long term	3	No impact	0
Probability of occurrence (C)	Highly Probable	3	No impact	0
Intensity of Impact(D)	Highly negative	-3	No impact	0
Degree of confidence (E)	Likely	2	No impact	0
Level of significance (AxBxD+E)xC before Mitigation	Highly, negative	-102	No impact	0
Level of significance after Mitigation	Moderate, negative Probable: - 2	-68		
Mitigation measures: • The social benefit fund should explore partnerships and other sources of funding. • Some funds should be invested as a source for future support to local youth.				
Related results				

The ceased social fund contribution will impact over the long term negatively on the development of teachers, offering scarce subjects and as a result the educational levels and readiness of local community. It will also impact negatively on the support to entrepreneurs and small businesses. Mitigation decreased the impact, but sustainability stays in question. The No Go alternative will have no impact.

k) Renewal of Plant (Solar and Hydrogen Facility)

The proposed solar and hydrogen facility has an average life span of 20 years. The resilience of the plant will direct renewal. This will be a new project and will not be assessed as such.

3.3.3 Indirect Impacts during the Decommissioning Phase

It is unlikely that the demolition of the proposed development could have indirect impacts.

3.3.4. Summary of impacts during the Decommissioning Phase

Overall, the construction phase brings about some direct and positive impacts, direct and negative impacts and indirect positive and negative impacts.

Direct and Positive Impacts during the Decommissioning Phase are tabulated below:

Table 60: A summary of direct and positive impacts, Decommissioning Phase

	Impact (s)	*Environment*	*Experienced as*	*Population Unit*	*Rating*	*Mitigated*
A	Employment opportunities increase	Economic: 30 jobs, 4 months	Working age people find employment temporarily and permanently	Individual, family and community	Low Positive	Low Positive
B	Increased Income	Economic and Social	Income of families increases as working age people are employed	Family	Low Positive	Low Positive
C	Skills development of working age population	Economic	Skills development (informal) of those that find employment temporarily.	Individual	Low Positive	Low Positive
D	Increased Local Sales and GGP	Economic: Low contribution: <1%	Increase in income	Community	Low Positive	Low Positive

Direct and Negative Impacts during the Decommissioning Phase are tabulated below:

Table 61: A summary of direct and negative impacts, Decommissioning Phase

	Impact (s)	*Environment*	*Experienced as*	*Population Unit*	*Rating*	*Mitigated*
E	Increased Use of Social Amenities & Services	Social & Economic	Diminishing social amenity and services capacity	Community	Low Negative	Nearly Neutralized
F	Increased traffic levels	Social	Motorized and non-motorized traffic levels increase	Community	Low Negative	Low Negative
G	Increased noise & dust levels	Social (Health)	Living conditions turn harsh with increased dust and noise	Individuals & Families	Low Negative	Neutralized
H	Change in sense of place	Social	Living environment change	Community	Low Positive	Moderate Positive
I	Retrenchments	Social	Loss of Income	Individual	Moderate Negative	Moderate Negative
J	Social benefits ceased	Social	Individual achievement and development benefit the Vanrhynsdorp community	Individual, Family and Community	High Negative	Moderate Negative

Overall, the positive impacts during the decommissioning phase outweigh the negative impacts:

Overall, the impacts during the decommissioning phase are:

The direct positive impacts are:

- The creation of 9 job or 30 employment opportunities with a wage bill of R2.3 million over 4 months and R2 million benefitting the locals, providing 22 unskilled and 17 semi-skilled and 2 skilled local people employment opportunities and contributing <1% to the Matzikama GDP;

The direct negative impacts are:

- Within limits, though negative, increased use of social amenities and services, decreased road safety and increased noise and dust.
- The change in the sense of place after decommissioning as the area return to its original state.
- Retrenchment and loss of income for 3 employees maintaining the solar and hydrogen facility.
- Social benefits ceased enabling individual achievement and development that benefits the Vanrhynsdorp community.

It is unlikely that there are residual impacts.

3.4 Cumulative Impacts

The cumulative impact associated with the proposed solar and hydrogen energy facility is largely of a visual nature and loss of agricultural land.

The presence of the PV panels on stands and the hydrogen plant and associated infrastructure and the associated impact on the sense of place of the surroundings was rated low. The significance of the visual impact, specifically the impact on the local sense of place, of the other facilities within the 30km radius is also rated as low as these facilities are located around Vredendal. The two settlements and the renewable energy facilities are not visible from one settlement to another.

The cumulative loss of agricultural land has a low impact as low potential agricultural soils that can only be used for grazing were selected for the different sites. The loss for agriculture relates to loss of grazing capacity which is not significant.

This study does not assess the overall cumulative impact i.e., the optimal number and location of solar facilities in the area, on the rural character and the sense of place of the surroundings or the agricultural ability and carrying capacity of the area.

3.5 Summary of impacts of the No Go Alternative

The No-Go Alternative would lose an opportunity for South Africa to supplement its current energy needs with clean, renewable energy and achieve its targets. Not reaching its targets and being one of the highest per capita producers of carbon emissions in the world (80% emission for energy use vs. 49% for developing countries) this alternative represents a negative impact socially and environmentally.

Furthermore, the No-Go Alternative will also

a) Result in a loss of employment opportunities generated during construction and operations.
b) Result in no social investment to support specific social (improvement of education in scarce subjects) and economic (enhancing small businesses) initiatives as identified by the specialist studies and developers.

This alternative represents a negative social cost particularly for the local community.

3.6 Recommendation

The proposed solar and hydrogen facility is deemed acceptable as it is:

Generating employment equal to 39 full-time jobs during all three phases benefitting the locals
Contributing at least R1 million per annum to the local wage bill
Generating work within <1km proximity, during operations.
Enhancing supply of bulk services as 10MWh and approximately 6500 households could be provided with electricity, during operations.

Mitigation measures to be included into the EMPR are summarized in Section 4 of the Assessment.

The proposed solar and hydrogen facility as a whole should be authorized.

Section 4. Management guidelines to address socio-economic impacts

In order to ensure that the disadvantages are managed to maximize positive impacts, specific management strategies and mechanisms need to become part of the proposed development. These strategies and mechanisms need to be implemented through development conditions and are as follows:

a) Preferential procurement of goods, services and labour,
b) Skills transfer
c) Security control
d) Safety Management
e) Traffic Regulation
f) Dust & noise control
g) Enhancing the economy
h) Maintaining Sense of place and Conservation Management
i) Maintaining Social benefits
j) Mitigating Retrenchments.

To implement the strategies and mechanisms, the development should enable the administration thereof. The administration of the strategies and mechanisms should be in partnership with the local authority.

The recommendations follow below.

4.1 Preferential procurement of goods, services and labour

Construction, Operation and Demolition

- Contractors, employing or seeking to employ local HDIs who are suitably qualified, should get preference;
- The municipality, local community and local community organizations should be informed of the project and potential job opportunities by the developer;
- The developer should, where necessary, assist local HDI owned firms to complete and submit the required tender forms on condition that local labour is used;

Construction & Operation

- Reserve a number of jobs for women and youth: Ensure contractor employ at least 90% locals of whom 80% were previously disadvantaged.
- Facilitate mechanisms to enable women and youth to access employment.
- Pay men and women doing and youth the same job, equally.
- Ensure that women gain equal access to training and education opportunities that men do.

Construction and Demolition

- A database of locally based firms, including SMME's owned and run by HDIs that qualify as service providers (construction companies, catering companies, waste collection companies, site cleaning companies etc.) should be compiled by the developer prior to the commencement of the tender process. These firms should be invited to bid for tenders;

- Establish a Monitoring Committee for the construction and decommissioning phase in collaboration with representatives of the local community. The Monitoring Committee has to ensure that the proposed solar and hydrogen facility is implemented and that any problems that arise which are associated with the construction and decommissioning phase are addressed.
- Developer and contractor to act as reference for locals employed.
- Developer and contractor to liaise with existing or future projects to access employment for locals.
- Reserve a number of jobs (90%) for local labour (un- & semi-skilled labour).
- Facilitate mechanisms to enable locals to access employment and learning opportunities offered by the proposed solar and hydrogen facility.

Operations and Demolition

- Developer and contractor to act as reference for locals employed.
- Developer and contractor to liaise with existing or future projects to enhance employment opportunities for locals.

4.2 Skills transfer

Construction

- The proposed development should enhance formal and informal skills transfer:
  - Should skilled persons from outside the community be employed, the developer should consider implementing a training and skills development programme to enhance the opportunities for local historically disadvantaged individuals in the construction and maintenance industry. Measures should be put in place to ensure successful training and development i.e., structured job shadowing and learnerships. Such a programme should be offered in liaison with an accredited Further Education and Training College like the West Coast College or University.
  - Some basic skills can be tutored at school level in a joint venture established by the developer between the primary schools in Vanrhynsdorp and the schools or education and skills training providers. In the long term (generationally) the improved skills level will ultimately lead to improved levels of education.
  - An "access to education support service" assisting future students should be considered attending to application fees for bursaries, career and financial planning and strategies for the period of studying.
- The proposed development should invest in teacher training to offer scarce subjects such as mathematics, science and physical science. Besides investing in teacher training the proposed development should fund the tuition of the scarce subjects.

Operational

- Skills transfer and development, formally and informally, should be implemented together with local education and skills training providers (e.g., job shadowing).
- Facilitate mechanisms to enable local young people to access the educational opportunities to attend courses in scarce subjects.
- Ensure local employees do benefit from on-the-job training.
- The educational opportunities should include formal and informal education:

- On successful completion of subjects and courses, opportunities to access further education should be made accessible.
- Facilitate mechanisms to enable local young people (who are not necessarily employed) to access the skills training opportunities.
- On the job training should include formal and informal training opportunities.

4.3 Security Control

Construction

- Regularly alternated twenty-four-hour security to guard the development.
- Documentation of all movement and vehicles entering and leaving the premises.
- Regular searching of all vehicles entering and leaving the premises.
- No persons not concerned with the development to enter on the premises.
- Limit access points to one point.

4.4 Safety Management

Construction and Demolition

- Adhere to international construction health and safety standards and precaution measures.
- Provide health and social training amongst the project team and in the community which include HIV/AIDs and Covid awareness training.

4.5 Traffic Regulation

Construction and Demolition

- Rehabilitate the gravel road during and particularly after construction and decommissioning to at least the same standard as is currently.
- Upgrade road signs to address the movement conflict.
- Road signs for protecting pedestrians crossing and accessing the road should be displayed.
- Provide transport to decrease pedestrian traffic.
- Restrict heavy vehicles to specific hours.
- Erect road signs signal times when heavy vehicles will make use of the road.

Construction

- Adhere to national traffic safety standards and precaution measures.
- Contractor/ Implementation agent to provide a traffic safety awareness programme amongst the project team and the community, particularly the kids

4.6 Dust and Noise control

Construction & Demolition

- Dust creation must be controlled as per construction and demolition management and control code.
- Noise creation should be controlled as per construction and demolition management and control code.

- Appoint an Environmental Control Officer to supervise construction and building and demolition.
- Adhere to the Environmental Management Plan (EMPr) for the Construction and Decommissioning Phase.
- All workers and management must undergo an induction course.
- Any natural habitat destroyed by constructing infrastructure should be rehabilitated.
- Enforce strict operating hours for heavy vehicles and construction activities on site to reduce noise and dust impacts on adjacent landowners.
- Implementation dust suppression measures;
- Access must be on recognized routes.
- Litter and littering must be strictly controlled.
- All construction waste and building rubble and demolition waste and rubble must be removed off site.

Construction

- All road construction must be limited to the road reserve.
- Cut and fill should be kept to a minimum and should be rehabilitated immediately.

4.7 Enhancing the economy

Construction, Operations and Demolition

- Contractors should be directed by tender criteria to purchase locally and to make use of local service providers.
- Spending money locally purchasing from locals and South African should benefit employees. The proposed development should leverage discount in the local economy of the municipal area and employees should be made aware of it.
- Small business should be supported (i.e., skills training, assistance and guidance to set up small businesses) and joint ventures with previous disadvantaged persons should be promoted.
- The promotion of joint ventures between small business (owned by previous disadvantaged persons) and more established business should be encouraged.

Operations

- Market the solar and hydrogen facility as a tourist destination.
- Create links with other tourism activities in Vanrhynsdorp through a website and the local tourism office.
- The promotion of joint ventures between small business (owned by previous disadvantaged persons) and more established business.
- Implement formal small business training and mentoring programmes.
- Ensure the compilation of a management plan (EMPr)

4.8 Maintenance of Sense of place:

Design and Planning phase

- Prepare an Environmental Constraints Plan to establish the environmental sensitive areas and those areas upon which the development may occur.

- Design buildings to reflect the local architecture and sense of place of the environment. Buildings and similar structures must be in keeping with regional planning policy documents, especially the principles of critical regionalism, namely sense of place, sense of history, sense of nature, sense of craft and sense of limits.
- Should it be required, install anti-reflective coating or glass to reduce the sunlight that is reflected and increase the amount of sunlight that is absorbed.
- Consider installing all electrical cables underground enroute to the substation.
- Where cables cannot be laid underground and electricity towers (pylons) need to be erected, install H-frame wooden poles, or similar structures, to transmit electrical lines instead or steel towers.

Construction and Operational phases

- An Environmental Control Officer (ECO) must be appointed to oversee the construction process and ensure compliance with conditions of approval.
- Contractor to sign and undertake to comply with Environmental Specifications
- Demarcate sensitive areas and no-go areas with danger tape to prevent disturbance during construction.
- Pre-construction keep disturbed areas to a minimum. No clearing of land to take place outside the demarcated footprint. Keep disturbed areas to a minimum.
- Throughout construction, identify suitable areas within the construction site for fuel storage, temporary workshops, eating areas, ablution facilities and washing areas.
- Throughout construction institute a solid waste management programme to minimize waste generated on the construction site and recycle where possible.
- Throughout construction reduce and control dust using approved dust suspension techniques as and when required.
- Construction to occur only during daytime. Should the ECO authorize night work, low flux and frequency lighting shall be used.
- Throughout construction, rehabilitate all disturbed areas in accordance with the development plan. Clear all alien vegetation.
- A photographic record of the site and its immediate surrounding area must be kept as part of the EMPr to serve as a baseline for measurement of all future visual impacts and as an aid to the full rehabilitation of the site should the facility be decommissioned in future.
- Excavation on the site is to be kept to the absolute minimum required for the successful implementation of the project.
- Outdoor lighting must be strictly controlled so as to prevent light pollution: Any necessary lighting must be shielded in such a way (such as trees and buildings or structures) that no direct light is allowed to escape into the surrounding terrain or up into the sky (All lighting must be installed at downward angles). Only the areas that are necessary to be lit must be lit with the surrounding. Use only minimum wattage light fixtures, such as trees and buildings or structures
- Utilize existing roads and tracks to the maximum extent possible.
- Provide where practical, pedestrian walkways where desire lines are identified.
- Visual management and maintenance: Scheme maintenance covering site tidiness should be maintained at all times including during construction.

- Buildings and similar structures must be in keeping with regional planning policy documents, especially the principles of critical regionalism, namely sense of place, sense of history, sense of nature, sense of craft and sense of limits.

Operational

- Maintain the general appearance of the facility as a whole (i.e., the PV panels, buildings and associated infrastructure, roads and natural environment).
    - Littering is to be strictly controlled over the entire life of the project
    - All waste is to be regularly removed from facility to a recognized dumping site. Waste, in any form, should not be allowed to collect on the site.
    - Visual management and maintenance: Scheme maintenance covering site tidiness should be maintained at all times including during construction.
- Monitor land surface below PV 'strings' to prevent loss of vegetation and first signs of desertification.
    - The use of any cleaning materials or defoliants to aid in the control of vegetation is to be strictly monitored so that their long-term use does no cause future problems should the site be decommissioned.
- Maintain access roads to prevent scouring and erosion, especially after rains.
    - Utilize existing roads and tracks to the maximum extent possible.
    - Provide pedestrian walkways where desire lines are identified.
- Monitor the use of lighting over the entire life of the project to minimize light pollution.
    - Strictly control outdoor lighting to prevent light pollution.
    - All lighting must be installed at downward angles.
    - Sources of light must as far as possible be shielded by physical barriers such as a planted trees and shrubs or built structures. Plant a screen of endemic bushes and trees together with fencing in natural colour and good plant maintenance. (Interface integration of proposed solar and hydrogen facility with surroundings).
    - Consider the application of motion detectors to allow the application of lighting only where and when it is required.
    - Only minimum wattage light fixtures must be used.
- A strict fire prevention policy must be implemented and monitored.

Decommissioning

- Prepare a decommissioning plan to establish a timeframe and order of decommissioning and rehabilitation of the plant.
- During demolition the site should be returned to as near as its existing state as is possible.
- All waste material has to be removed.
    - Removal of all infrastructure introduced into the landscape (i.e., PV panels, ancillary infrastructure such as a maintenance workshop, storage building and offices).
    - Rehabilitate all new access roads created during the construction period.
    - Institute monitoring of all decommissioned and rehabilitated sections of the project site at regular intervals.

4.9 Loss of Agricultural land and activities

General

- Implement recommendations of Visual Impact Assessment and Agricultural Impact Assessment.
- Implement Environmental Management Plan.

Construction Phase:

The site should be developed with as little disturbance as possible to be able to rehabilitate it back to its natural form:

- Control vehicle access and constructional activity on roads and minimal footprint areas only.
- Strip and stockpile topsoil from all areas where soil will be disturbed. After cessation of disturbance, re-spread topsoil over the surface.
- Dispose of any sub-surface, clay spoils from excavations where they will not impact on vegetated land, or where they can be effectively covered with topsoil.

Operational Phase:

- Implement an effective system of storm water run-off control at any point where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion.
- Any occurrences of erosion must be attended to immediately and the integrity of the erosion control system at that point must be amended to prevent further erosion from occurring there.
- Maintain where possible all vegetation cover and facilitate re-vegetation of uncovered areas throughout the site, to stabilize disturbed soil against erosion, and to reduce dust formation.
- If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface, and then stabilized by facilitating vegetation cover.
- Enhance on-site conservation where appropriate.

Construction, Operational and Decommissioning

Implement an effective system of run-off control which collects and disseminates run-off water from hardened surfaces and prevents potential down slope erosion (all phases).

4.10 Maintaining Social Benefits

Decommissioning

- The social benefit fund should explore partnership and other sources of funding.
- Some funds should be invested as a source for future support to local children.

4.11 Mitigate Retrenchments

Decommissioning

- During the contract period, provision should be made for those employed to obtain additional skills set.
- Effort should be made to obtain placement for contract workers in either their current or their alternative field of expertise.
- The developer should establish a fund from which these contractors could benefit.
- The established Monitoring Committee for the construction and demolition phases in collaboration with representatives of the local community, has to ensure that that the EMPr is implemented and the solar and hydrogen facility is decommissioned and that any problems that arise and is associated with the decommissioning phase, is addressed.

4.12 Conclusion

The above management guidelines have been presented in terms of the specific social constraints that might result due to the proposed Solar and hydrogen Facility and related infrastructure. These guidelines aim to change the social constraints of the proposed development into benefits in favour of the local community of Vanrhynsdorp and the inhabitants of Matzikama Municipality.

Addendum A

Assessment Measures

The assessment departs from a factual description of the nature of the impact. This description is followed by an appraisal including a description of the effect the activity has on the environment. The description should include what is being affected and how it is affected. Assessment Measures are then applied to refine the results.

Extent (A)

This assessment measures the geographical scale of the impact

Extent of the Impact		
Rating	**Definition of rating**	*Score*
Local	Extending only as far as the activity, Will be limited to the site and its immediate surroundings	*4*
Regional	Will have an impact on the region	*3*
National	Will have an impact on a national scale	*2*
International	Will have an impact across international borders	*1*

Usually, the scores are in ascending order from 1 to 4 (local to international) but given the levels of poverty and remoteness the scores for this project have been changed to a descending order of 4 to 1 (local to international).

Duration (B)

This assessment measure indicates the lifetime of the impact.

Duration of the Impact		
Rating	***Definition of rating***	***Score***
Short term	*0-5 years*	***1***
Medium term	*e.g., 5-15 years*	***2***
Long term	The impact will cease after the operational life of the activity, either because of natural process or by human intervention	***3***
Permanent	Where mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient	***4***

The duration of some of the impacts during construction is considered mainly short term, whilst the duration of the impacts during the operational phase is considered long term.

Intensity (C)

Here it should be established whether the impact is destructive or benign and should be indicated as:

Intensity of the Impact		
Rating	***Definition of rating***	***Score***
Low	The impact affects the environment in such a way that natural, cultural and social functions and processes are not affected	***1(±)***
Medium	The affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and	***2(±)***
High	Natural, cultural or social functions or processes are altered to the extent that it will temporarily or permanently cease.	***3(±)***

The intensity of some of the impacts of the proposed project varies. In the case of the proposed project the criteria were customize and refined to their particular study (e.g., a positive impact of "high" significance is when the project could reduce local employment by 5% or more).

Probability (D)

This should describe the likelihood of the impact actually occurring indicated as:

Probability of the Impact		
Rating	***Definition of rating***	***Score***
Improbable	The possibility of the impact to materialize is very low either because of design or historic experience;	***1***
Probable	There is a distinct possibility that the impact will occur	***2***
Highly probable	It is most likely that the impact will occur	***3***
Definite	The impact will occur regardless of any prevention measures	***4***

Confidence (D)

This should describe the ability of the receiving community to absorb the impact actually occurring:

Probability of the Impact		
Rating	***Definition of rating***	***Score***
Unlikely	The receiving community is resilient.	***1***
Likely	The receiving community is a rigid	***2***
Highly Likely	The receiving community is marginal	***3***
Definite	The receiving community is vulnerable	***4***

Significance

The significance of impacts can be determined through a synthesis of the aspects produced in terms of their nature, duration, intensity, extent and probability and be described as:

Significance of the Impact: (F)= (A*B*D+E)*C			
Rating	***Definition of rating***	***Score***	
Low		**0 to – 40**	**0 to 40**
Medium		**- 41 to - 80**	**41 to 80**
High		**- 81 to - 120**	**81 to 120**
Very High		**> - 120**	**> 120**
The above significance bands have been determined through calculating a maximum potential score of 156 (e.g., positive or negative) applying the above criteria. This was then subdivided into broad bands as indicated above to provide a comparative assessment of all impacts in relation to the maximum possible significance score. The overall status of the impact (after mitigation) for the preferred alternative are also assessed applying the above criteria.			

The above rating scales will be applied to assess the impacts during the construction, operational and decommissioning phase.

References

Lanz, J: July 2021. Site sensitivity verification and agricultural agro-ecosystem specialist assessment forproposed development of Van Rhynsdorp Green Solar Power Plant, outside Van Rhynsdorp, Western Cape Province

New World Associates Landscape Architects(Eitzen, B): July 2021. Van Rhynsdorp Green Energy, WC: Visual Impact Assessment - Portion of Erven 401, 1515 and Farm Portion 596, Van Rhynsdorp WC.

Statistics South Africa, 2011. Census 2011.

Swartland Municipality: Swartland Municipality Spatial Development Framework, 2017 - 2022.

Swartland Municipality: Local Economic Development Strategy, Swartland Municipality, 2009

Swartland Municipality: Swartland Municipality, Integrated Development Programme, 2017 – 2020