# ENVIRONMENTAL IMPACT ASSESSMENT REPORT

EIA Report for the proposed development of the Vhuvhili Solar Photovoltaic (PV) Facility near Secunda in the Mpumalanga Province

## CHAPTER 1:

# Introduction

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# 1. INTRODUCTION

## 1.1 Project Overview

The Project Applicant, Vhuvhili Solar (RF) (Pty) Ltd (hereafter referred to as the "Project Applicant"), is proposing to design, construct and operate the Vhuvhili Solar Photovoltaic (PV) Energy Facility and its associated infrastructure approximately 7 km south-east of the town of Secunda in the Mpumalanga Province. The proposed Vhuvhili Solar Energy Facility (SEF) will have a capacity of up to 300 MW (export) and is subject to a full Scoping and Environmental Impact Assessment (S&EIA) process. The locality and current footprint of the proposed project is depicted in Figure 1-1. It should be noted that the project layout has been updated following sensitivities identified by the specialists that needed to be avoided (including croplands). The initial project layout which was presented in the Scoping phase is included in Figure 1-1. This project layout was then updated based on sensitivities identified by the specialists that needed to be avoided, and an updated project layout taken into the EIA Phase is presented in Chapter 2 (project description). The project layout recommended for approval is included in the Conclusions and Recommendations (Chapter 19 of this EIA Report). The proposed project is situated in the Govan Mbeki Local Municipality and the Gert Sibande District Municipality, in the Mpumalanga Province (Figure 1-2).

The infrastructure associated with the proposed Vhuvhili SEF includes a Battery Energy Storage System (BESS) and various structures, buildings, and electrical grid infrastructure (EGI) such as an on-site 33/132 kV Substation (SS). Two site alternatives for the on-site SS and BESS (known as the SS and BESS complex) have been identified by the Project Applicant. These are Alternative 1 (A-B) and Alternative 2 (C-D) as shown in Figure 1-3. A construction laydown area was also identified and includes the Operation and Maintenance (O&M) buildings. A detailed project description is provided in Chapter 2 of this report.

The proposed Vhuvhili SEF will be developed on the farm portions as indicated in Table 1-1 which also specifies the corresponding 21-digit Surveyor General code for each affected farm portion. The properties to be affected by the proposed Vhuvhili SEF development will be leased from the property owners by the Project Applicant for the life span of the Vhuvhili SEF (i.e., up to 25 years).

**Table 1-1: Farm portions affected by the proposed Vhuvhili SEF project that were assessed by the specialists in the Scoping phase**

| Farm name | Farm No. | Farm Portion | SG code |
|---|---|---|---|
| GROOTVLEI | 584 | RE | T0IS00000000058400000 |
| GROOTVLEI | 293 | 18 | T0IS00000000029300018 |
| GROOTVLEI | 293 | 20 | T0IS00000000029300020 |
| GROOTVLEI | 293 | 21 | T0IS00000000029300021 |
| POVERTY ACRES | 585 | RE | T0IS00000000058500000 |
| VLAKSPRUIT | 292 | 21 | T0IS00000000029200021 |

The electricity generated by the proposed Vhuvhili SEF will be transferred from the proposed on-site substation at the proposed Vhuvhili SEF via a 132 kV power line which will extend approximately 12 km in length to the proposed switching station at the proposed Mukondeleli WEF (Figure 1-3). From there the combined electricity produced by the two Renewable Energy Facilities (REFs) will be transferred to a step-down substation at Sasol where it will be used for the production of green hydrogen and aviation fuel.

The proposed power line is subject to a separate Basic Assessment (BA) process which is undertaken by the Project Applicant in parallel to this EIA process. The proposed Mukondeleli WEF is also subject to a separate S&EIA process which is undertaken by the Project Proponent (NEAS Reference: MPP/EIA/0001099/2022).

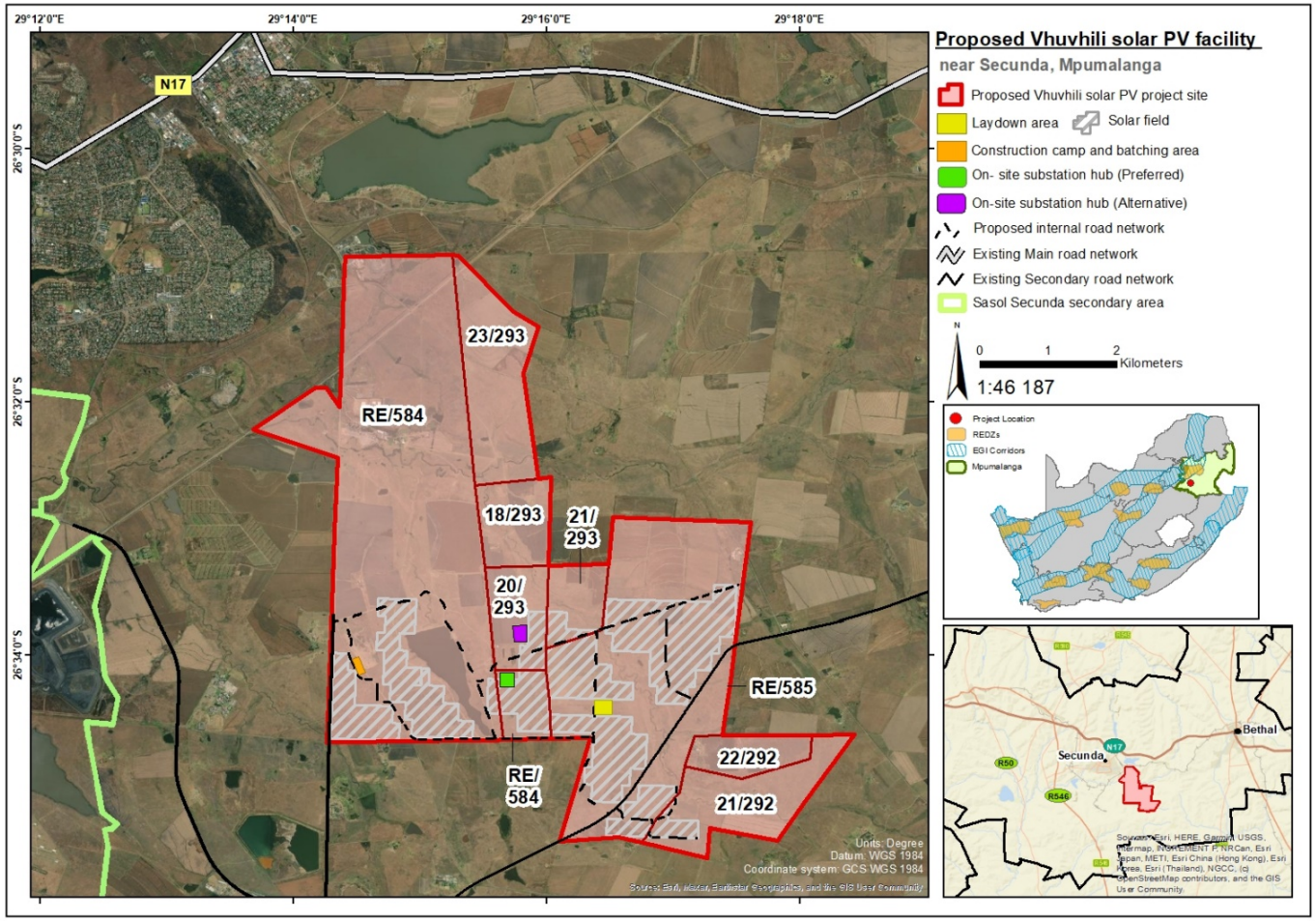


**Figure 1-1: Locality map for the proposed Vhuvhili Solar PV Facility near Secunda in the Mpumalanga Province (as per the layout which was provided in the Scoping Phase).**

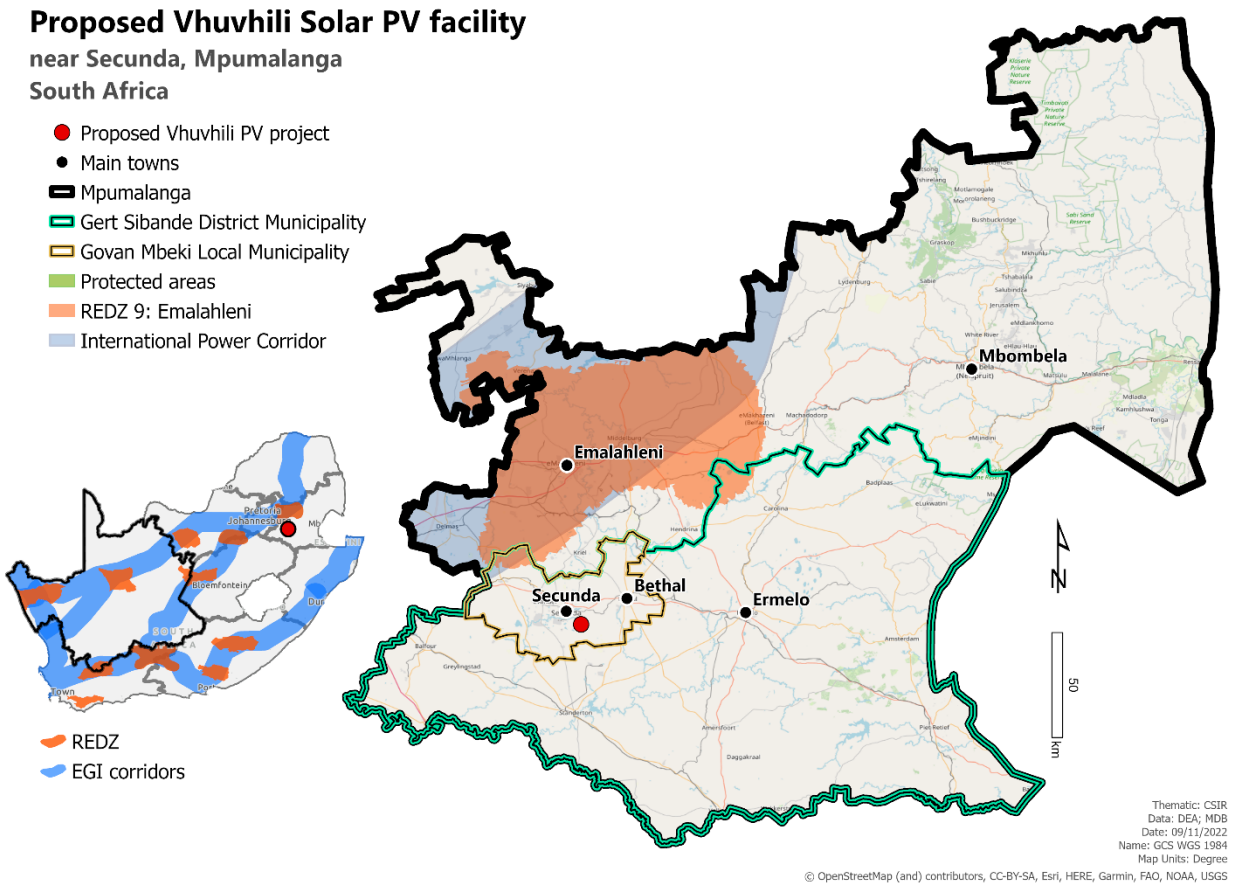


**Figure 1-2: Regional context map for the proposed Vhuvhili SEF situated near Secunda in the Mpumalanga Province.**

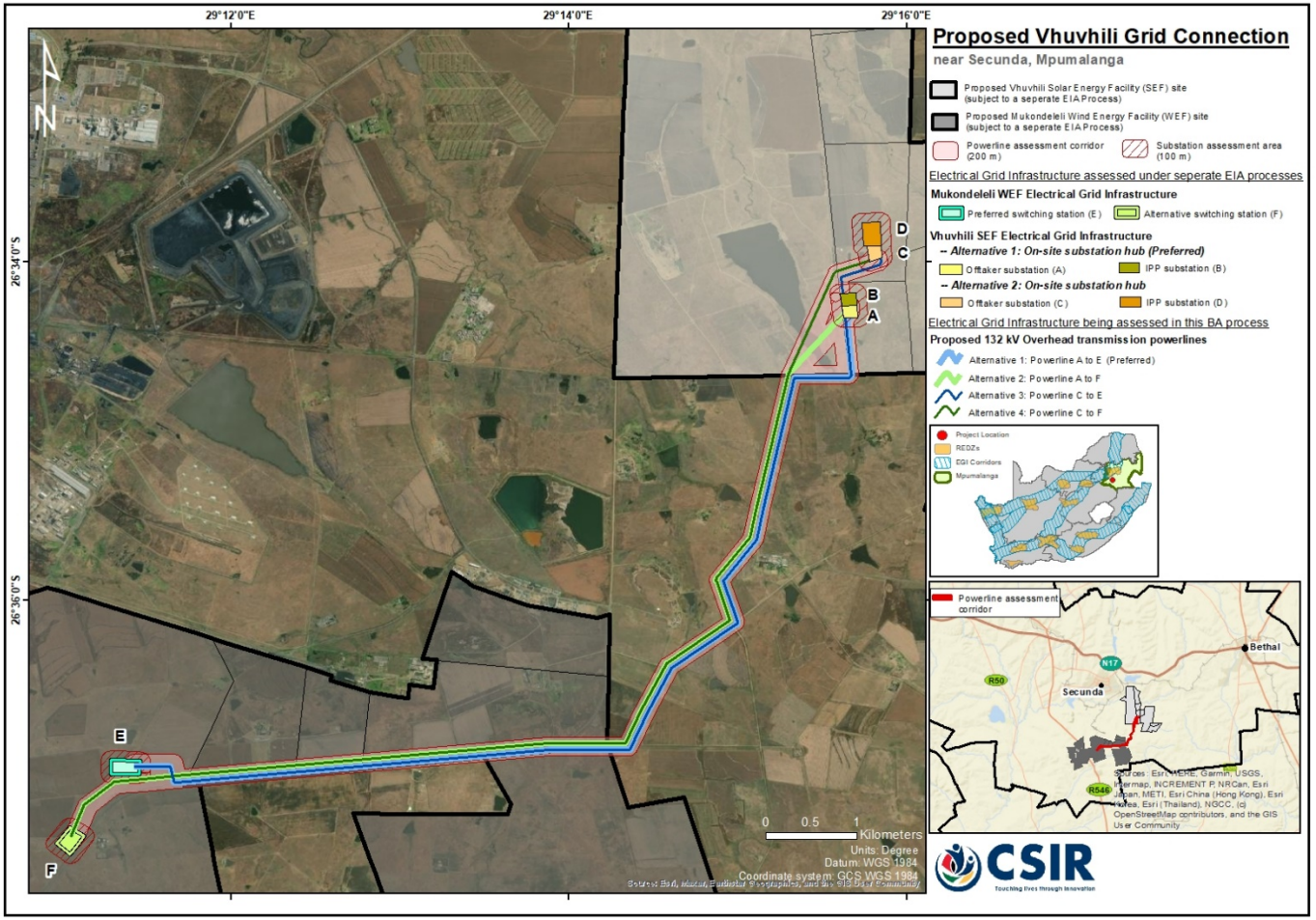


**Figure 1-3: Proposed Substation and BESS Alternatives at the proposed Vhuvhili SEF site. The proposed power line routing and Electrical Grid Infrastructure associated with the proposed Vhuvhili SEF are also shown (subject to a separate Basic Assessment process).**

## 1.2 Project Coordinates

The approximate co-ordinates of the boundary points of the Vhuvhili SEF project site are included in Table 1-2a. A map corresponding to the co-ordinate points is provided in Figure 1-4. Coordinates of the mid-point of the development area as well as the mid-points of the preferred on-site SS and BESS complex (Alternative 1: Substation and BESS complex (A-B) and Alternative 2: Substation and BESS complex (C-D)) are also included in Table 1-2b.

**Table 1-2a. Co-ordinate Points along the boundary of the proposed Vhuvhili SEF project**

| Point | Decimal Degrees | | Degrees, minutes, seconds | |
|---|---|---|---|---|
| | Latitude (x) | Longitude (y) | Latitude (S) | Longitude (E) |
| Vh-1 | -26.54433876 | 29.25721027 | 26° 32' 39.61953960" S | 29° 15' 25.95697920" E |
| Vh-2 | -26.54328622 | 29.26718574 | 26° 32' 35.83038120" S | 29° 16' 01.86864600" E |
| Vh-3 | -26.55489368 | 29.26689568 | 26° 33' 17.61725160" S | 29° 16' 00.82444800" E |
| Vh-4 | -26.55466081 | 29.27459275 | 26° 33' 16.77893400" S | 29° 16' 28.53388920" E |
| Vh-5 | -26.54852396 | 29.27534263 | 26° 32 '54.68625960"S | 29° 16' 31.23345360" E |
| Vh-6 | -26.54915423 | 29.29346455 | 26° 32' 56.95522440" S | 29° 17' 36.47239440" E |
| Vh-7 | -26.57724549 | 29.28973633 | 26° 34' 38.08377120" S | 29° 17' 23.05079160" E |
| Vh-8 | -26.57730909 | 29.28609283 | 26° 34' 38.31272760" S | 29° 17' 09.93417720" E |
| Vh-9 | -26.58129958 | 29.28478309 | 26° 34' 52.67848800" S | 29° 17' 05.21910600" E |
| Vh-10 | -26.58293606 | 29.29226963 | 26° 34' 58.56980160" S | 29° 17 32.17066080" E |
| Vh-11 | -26.58028319 | 29.30130316 | 26° 34' 49.01948040" S | 29° 18 04.69137240" E |
| Vh-12 | -26.57716295 | 29.30143481 | 26° 34' 37.78660920" S | 29° 18 05.16533040" E |
| Vh-13 | -26.57703712 | 29.30707884 | 26° 34' 37.33362480" S | 29° 18 25.48384200" E |
| Vh-14 | -26.58590763 | 29.30064886 | 26° 35' 09.26747520" S | 29° 18 02.33588880" E |
| Vh-15 | -26.59108576 | 29.29698085 | 26° 35' 27.90873600" S | 29° 17 49.13106360" E |
| Vh-16 | -26.58940731 | 29.28806373 | 26° 35' 21.86629800" S | 29° 17' 17.02942800" E |
| Vh-17 | -26.59331906 | 29.28778901 | 26° 35' 35.94861960" S | 29° 17' 16.04045040" E |
| Vh-18 | -26.59125058 | 29.27905696 | 26° 35' 28.50207360" S | 29° 16' 44.60505960" E |
| Vh-19 | -26.59056236 | 29.27604052 | 26° 35' 26.02448880" S | 29° 16' 33.74586480" E |
| Vh-20 | -26.59116897 | 29.26834279 | 26° 35' 28.20828840" S | 29° 16' 06.03403320" E |
| Vh-21 | -26.57754636 | 29.2724087 | 26° 34' 39.16688520" S | 29° 16' 20.67132360" E |
| Vh-22 | -26.57813203 | 29.23776867 | 26° 34' 41.27532240" S | 29° 14' 15.96722280" E |
| Vh-23 | -26.5406808 | 29.2391221 | 26° 32' 26.45087100" S | 29° 14' 20.83956252" E |
| Vh-24 | -26.53700158 | 29.22805544 | 26° 32' 13.20569988" S | 29° 13' 40.99957572" E |
| Vh-25 | -26.53145922 | 29.23614667 | 26° 31' 53.25319920" S | 29° 14' 10.12800120" E |
| Vh-26 | -26.53150498 | 29.23761346 | 26° 31' 53.41791360" S | 29° 14' 15.40846680" E |
| Vh-27 | -26.53398631 | 29.23940258 | 26° 32' 02.35073040" S | 29° 14' 21.84927000" E |
| Vh-28 | -26.51426168 | 29.24014483 | 26 30' 51.34204080" S | 29° 14' 24.52139520" E |
| Vh-29 | -26.51404428 | 29.2542462 | 26 30' 50.55942240" S | 29° 15' 15.28632360" E |

**Table 1.2b. Co-ordinate Points of the mid-point of the proposed Vhuvhili SEF study area and mid-point of the preferred on-site Substation and Battery Energy Storage System complex area**

| Point | Decimal Degrees | | Degrees, Minutes, Seconds | |
|---|---|---|---|---|
| | Latitude (x) | Longitude (y) | Latitude (S) | Longitude (E) |
| Mid-point of project area | -26.570994 | 29.260944 | 26° 34' 15.5784" | 29° 15' 39.3984" |
| Mid-point of preferred on-site SS and BESS complex Alternative 1: Substation and BESS complex (A-B) | -26.564479 | 29.26324 | 26° 33' 52.1244" | 29° 15' 47.664" |
| Mid-point of preferred on-site SS and BESS complex Alternative 2: Substation and BESS complex (C-D) | -26.556133 | 29.265272 | 26° 33' 22.0788" | 29° 15' 54.9792" |

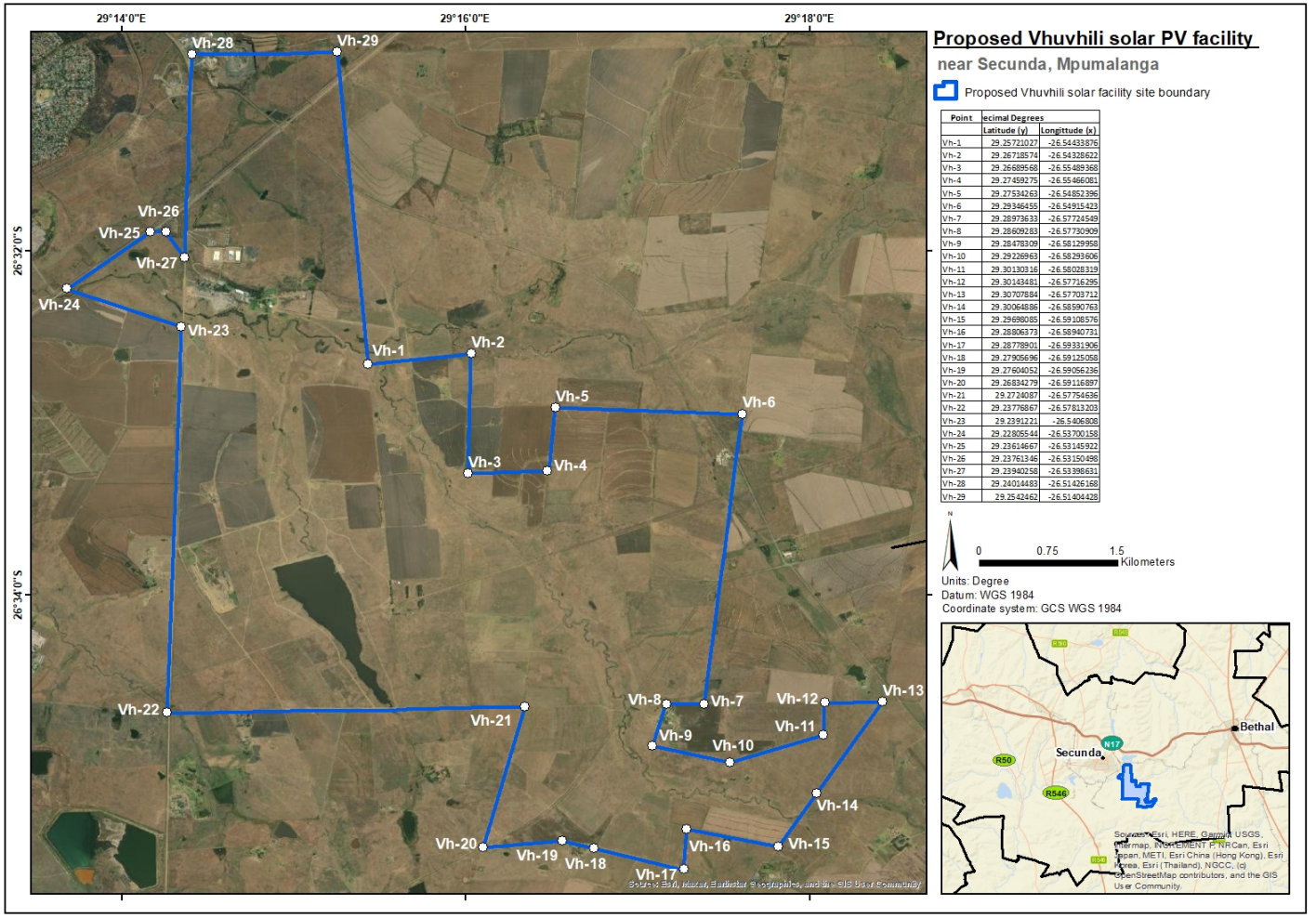


**Figure 1-4: Vhuvhili SEF Boundary Co-ordinate Point Map.**

## 1.3 Project Scenarios

The Project Developer, ENERTRAG South Africa (Pty) Ltd (hereafter referred to as the "ENERTRAG"), is currently investigating two scenarios for the uptake of energy from the proposed Vhuvili SEF:

***Scenario 1:***

The proposed Vhuvhili SEF is planned to provide renewable energy to Sasol (via the 132 kV power line from the on-site substation at the proposed Vhuvhili SEF to the switching station at the proposed Mukondeleli WEF from where the electricity will be transferred to Sasol) for the production of green hydrogen and green aviation fuel. This is viewed as the main proposed outcome of the proposed project, via an agreement between several consortium parties including ENERTRAG and Sasol.

***Scenario 2:***

Alternatively, should the above agreement not materialise under Scenario 1, and a private off-taker of the renewable energy cannot be obtained, the proposed Vhuvhili SEF will be bid into the future rounds of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) or similar tender processes. It is understood that the Environmental Authorisation (EA) received by the competent authority, i.e., the Mpumalanga Department of Agriculture, Rural Development and Land Affairs (DARDLEA) for the proposed Vhuvhili SEF (should it be granted) would be suitable for both scenarios. Furthermore, the scenario of providing the proposed renewable energy to Sasol via a private off-taker agreement and the scenario of bidding the project into the REIPPPP would have no bearing on the assessment of potential environmental impacts of the proposed project by the Environmental Assessment Practitioner (EAP).

Therefore, both scenarios have been documented in the EIA Report, i.e., Scenario 1 of having a private off-taker (i.e., Sasol) and Scenario 2 of bidding the project into the REIPPPP or another suitable tender process.

## 1.4 Project Motivation

### *1.4.1. The need for renewable energy in South Africa*

The need for renewable energy is becoming increasingly apparent, in both local and international context, with South Africa becoming an integral part of the global transition towards renewable sources of electricity generation. The urgency behind this evolution can be appreciated considering that South Africa is one of the largest emitters of greenhouse gases in Africa[1] and is also estimated to rank amongst the top 20 largest emitters of greenhouse gases in the world. These emissions are largely a result of an energy-intensive economy and high dependence on coal-based electricity generation to meet more than 90% of its energy needs. South Africa is therefore one of the highest per capita producers of carbon emissions in the world and Eskom, as an energy utility, has been identified as the world's second largest producer of carbon emissions. The South African government is therefore committed to supplementing the existing generation capacity of thermal and nuclear power plants with renewable energy power generation, thus

[1] https://ourworldindata.org/co2/country/south-africa?country=ZAF~NGA~KEN~ZWE~IRN~LBY~GIN~LBR~MWI~TGO~BWA~BFA~BDI~CMR~SDN#citation
Ritchie, H. and Roser, M. 2020. "$CO_2$ and Greenhouse Gas Emissions". Published online at OurWorldInData.org. viewed 07 April 2021 https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions

creating the framework that will lead to an increase in the supply of clean energy for the nation. The development of renewable energy is important for South Africa to reduce its overall environmental footprint from power generation (including externality costs), and thereby to steer the country on a pathway towards sustainability. Furthermore, as of 2020, the largest point source of CO2 emissions in the world is the Sasol Secunda Coal-to-Liquid plant, at 56.5 million tonnes $CO_2$ a year.

South Africa has heavily relied on coal as a source of electricity for decades. Due to the nature of coal as a non-renewable resource that causes major environmental degradation, there is therefore a need to identify alternative resources that could promote sustainable energy sources. South Africa is facing the challenge of securing clean, affordable, and sustainable energy to power its economy and to contribute to the transition to a climate-neutral society. A clean energy future is seen as a critical enabler of inclusive and transformational economic growth and development. This challenge is addressed in the National Energy Act of 2008 which aims to ensure that diverse energy resources are available in affordable quantities to the South African economy to support economic growth and poverty alleviation whilst accounting for surrounding environments and economic sectors[2].

Commitment toward decarbonisation of the economy is clearly illustrated in the South Africa's National Development Plan (NDP) Vision 2030 published in 2012. Chapter 4 and 5 of the NDP advocate for increased investment in an energy sector that is both economically inclusive and environmentally sustainable – with renewable energy at the core of enabling this transition. The plan identifies, as a priority, the production of sufficient energy to support industry at competitive prices, ensuring access for poor households, while reducing the carbon intensity of the economy[3].

Further, the Minister of the Department of Forestry, Fisheries, and the Environment (DFFE), Ms Barbara Creecy, announced the approval of the revised National Determined Contribution (NDC), the Climate Bill and South Africa's negotiating position for COP26 during a Media Release on 22 September 2021. The NDC describes South Africa's contribution to global efforts to reduce Greenhouse Gas (GHG) emissions and mitigate climate change. The revised NDC includes the updated mitigation target range of 350-420 Mt $CO_2$-eq (previously 398-614 Mt $CO_2$-eq) in line with targets set out in the Paris Agreement. The updated NDC also states that emissions are due to decline from 2025 (previously 2035) [4].

The transition from an intense carbon-based energy system with substantial dependence on coal to a sustainable, clean, and affordable energy system based on renewable resources is therefore a priority for South Africa as it pursues both economic prosperity and its international climate commitments.

The proposed Vhuvhili SEF will also have international significance as it will contribute to South Africa being able to meet some of its international obligations by aligning domestic policy with internationally agreed strategies and standards as set by the United Nations Framework Convention on Climate Change (UNFCCC), the Paris Agreement on Climate Change, Kyoto Protocol, and the United Nations Convention on Biological

[2] Strambo, Claudia, Jesse Burton, and Aaron Atteridge.2019, The End of Coal? Planning a 'Just Transition' in South Africa. Stockholm Environment Institute.
[3] Strambo, Claudia, Jesse Burton, and Aaron Atteridge.2019, The End of Coal? Planning a 'Just Transition' in South Africa. Stockholm Environment Institute.
[4] Department of Forestry, Fisheries and the Environment (DFFE), South African delegation meets climate envoys ahead of CoP26, Media release, [Online]. Available https://www.environment.gov.za/mediarelease/cop26climateenvoysmeeting. [Accessed 30 September 2021]

Diversity (UNCBD), all of which South Africa is a signatory to. Renewable electricity is critical to South Africa as this source of energy is recognised as a major contributor to climate protection, has a much lower environmental impact significance, as well as advancing economic and social development.

While renewable electricity is essential to achieve decarbonization targets globally as per the 2015 Paris Agreement, direct electrification is not feasible in hard-to-abate sectors, such as heavy-duty, long-distance transport (buses, trucks, shipping, and commercial aviation) and heavy manufacturing industries (Roos, 2021)[5]. It is more feasible to decarbonize these sectors using renewable electricity in an indirect manner, by means of synthetic gaseous or liquid fuels (Roos, 2021). Green hydrogen has been identified as a low-carbon solution to meet GHG emission reduction targets and to power industries in which emissions have previously been difficult to abate[6]. Hydrogen is also used in various industrial processes, such as ammonia production, and thus has the potential to contribute to decarbonising a variety of industries.

What makes green hydrogen 'green' is the input of energy from a renewable energy source (e.g., solar or wind energy) to operate the electrolyser – the key component in the green hydrogen production process. In October 2021, at the second Sustainable Infrastructure Development Symposium, President Cyril Ramaphosa, stated that green energy had the potential to drive industrialisation and establish a whole new industrial reality. Furthermore, the President stated that "We stand ready to be a major exporter in this market, to use hydrogen to rapidly decarbonise our existing industries, and attract industrial investment from across the globe seeking to meet new standards of green power in the production process". The proposed development of the Vhuvhili SEF directly addresses the President's statements and the need to implement renewable energy technologies and green fuels and/or products in Mpumalanga.

In the Govan Mbeki Local Municipality, the mining sector (39%) and manufacturing sector (24%) contributes the most in terms of GDP. In the SWOT analysis undertaken as part of the municipalities Integrated Development Plan (IDP) process, one of the threats identified is the closure of the Mining and the Petro-chemical industry. It notes that "coal is a finite resource and exhausting coal deposits, and reserves means Govan Mbeki will become a ghost town with very high unemployment, poverty and poor living conditions" (Govan Mbeki IDP, 2022-2027). The proposed project will therefore improve the resilience of the local economy which has come to depend on coal mining which the IDP recognises as a finite resource and a vulnerability of the local economy. Therefore, the proposed project would help to address the need for increase local economic resilience while also providing advanced skills transfer and training to the local communities and creating contractual and permanent employment in the area. According to the Govan Mbeki Municipal Economic Development Strategy (2014), new energy sources (preferably renewable energy such as solar and wind) represent a key side linkage to complement the coal mining and fuel production economic activities of the local economy. It is recognised that such side linkages, or diversifying of the local economy, will provide catalytic opportunities for further economic development of the municipality. The project also represents a move by Sasol to transition to the

[5] Department of Forestry, Fisheries and the Environment (DFFE), South African delegation meets climate envoys ahead of CoP26, Media release, [Online]. Available https://www.environment.gov.za/mediarelease/cop26climateenvoysmeeting. [Accessed 30 September 2021]

[6] Department of Forestry, Fisheries and the Environment (DFFE), South African delegation meets climate envoys ahead of CoP26, Media release, [Online]. Available https://www.environment.gov.za/mediarelease/cop26climateenvoysmeeting. [Accessed 30 September 2021]

production of greener energy sources, which will additionally create business and employment resilience in the energy production industry. In this manner, should the proposed development be authorised, it will pave the way towards a Just Energy Transition in Mpumalanga.

### *1.4.2. The Green Hydrogen Economy*

Hydrogen is widely referred to as an energy vector as it is an "energy-rich substance that facilitates the translocation and/or storage of energy [...] with the intention of using it at a distance in time and/or space from the primary production site"[7]. Green hydrogen is obtained through the electrolysis of water into hydrogen and oxygen molecules, using electricity obtained from renewable sources.

Positive energy trends moving towards decarbonisation goals in the energy sector have been noted since 2014. This trend is strongly attributed to the implementation of national policies and subsidies supporting renewables which resulted in the reduced cost of renewable energy and a consequent rapid roll out of REFs between 2014 and 2019. The trend of the decreasing cost and consequent increased accessibility of renewable electricity opens opportunities for feasible production of green hydrogen[8]. Therefore, countries such as South Africa which are rich in renewable energy resources are at a competitive advantage lead in the global export of green hydrogen[9].

In addition, South Africa's land availability, and decreasing cost of renewable energy projects provides an opportunity "position itself as a country that can produce renewable hydrogen at scale and at competitive prices, triggering an export market from which economic growth and energy independence can be derived"[10].

### *1.4.3. South Africa's experience with Fischer-Tropsch Technology*

South Africa's rich endowment of natural resources for renewable energy, coupled with Sasol's experience as a world leader in Fischer-Tropsch (FT) technologies, positively positions the country as a strong global contender to cost-effectively produce green hydrogen. Priscillah Mabelane, Executive Vice President for Energy at Sasol, expressed in a statement that Sasol believes "that Southern Africa is well positioned to play in the global green hydrogen economy due to key structural advantages. Our proprietary Fischer-Tropsch (FT) technologies and renewable endowments, are some of the best in the world". She added that Sasol has committed to be net zero by 2050 and sees green hydrogen as core to enabling this goal."

The current FT process involves the conversion of coal into hydrocarbons via gasification in a Lurgi gasifier. Cooled oxygenated hydrocarbons are thereafter converted into a wide range of liquid fuels and chemicals[11]. The FT facilities at Secunda (Sasol Two and Sasol Three) account for 80% of Sasol's global GHG

[7] Abdin, Z., Zafaranloo, A., Rafiee, A., Mérida, W., Lipiński, W. and Khalilpour, K.R, "Hydrogen as an energy vector". Renewable and sustainable energy reviews, 120, p.109620, 2020

[8] Roos, T and Wright, J., 2021, Powerfuels and Green Hydrogen (public version). European Union

[9] Bischof-Niemz, T. "Liquid fuels from wind: Turning South Africa into the Saudi Arabia of the sustainable energy era," in Workshop: The Potential for Powerfuels, 9 December, Johannesburg, 2019.

[10] DSI (Department of Science and Innovation). 2021. Hydrogen Society Roadmap for South Africa 2021: Securing A Clean, Affordable and Sustainable Energy. Pp 15. Available at: https://www.dst.gov.za /index.php/resource-center/strategies-and-reports/3574-hydrogen-society-roadmap-for-south-africa-2021

[11] De Klerk, A., 2008, Fischer-Tropsch Refining. Philosophiae Doctor Thesis, University of Pretoria.

emissions. Sasol has emphasised its commitment to transition towards a less carbon intensive process and reducing GHG emissions via the use of through efficiency and cleaner energy sources. Incorporating green hydrogen into the FT process can significantly assist in lowering GHG emissions and meeting climate targets. Further, it is noted that the use of green hydrogen and green carbon (i.e., carbon captured from existing fuel gas or the air) in the production of Powerfuels will greatly assist Sasol and South Africa in meeting climate targets whilst ensuring a Just Energy Transition. The incorporation of green hydrogen in the FT process would also contribute to the beneficiation of South African Platinum reserves as platinum is a key component for electrolyser technology, required to produce green hydrogen.

Several global future markets have emerged for low-carbon Powerfuels. These markets provide numerous opportunities for South African businesses and international businesses located in South Africa[12], and thus have the potential to contribute to decarbonising a variety of industries. The aviation industry in particular is considered globally as one of the most challenging sectors to decarbonise. The production of Sustainable Aviation Fuels (SAFs) using green hydrogen and green carbon is considered key in reducing GHG emissions in the industry[13]. South Africa's rich endowment in renewable resources and experience with the FT process presents a key strategic advantage to address the decarbonisation of the aviation sector.

In 2021 Sasol partnered with Linde PLC, ENERTRAG AG and Navitas Holdings (Pty) Ltd to form the LEN Consortium whose main aim is to explore the feasibility of SAF production at the Secunda Synfuels plant in Mpumalanga, in order to produce to bid SAF under Germany's H2Global platform[14]. A successful bid would significantly improve South Africa's capacity to become a major role player in the global hydrogen economy, as well as improve the country's domestic green hydrogen production capacity[15.] Apart from increased energy security, it is also expected that the benefits of SAF production will promote socio-economic development through job creation in areas where biomass is farmed for feedstock[16]. This will contribute towards a just energy transition through the re-skilling of communities to take up opportunities in new and emerging energy areas[17].

The capacity of the SAF production project at the Secunda Synfuels plant is expected to comprise of up to 500 MW of renewable energy (i.e., using wind and solar technology) and a 150 MW hydrogen electrolyser to produce approximately 60,000 t/a of SAF (Figure 1-5). Should the proposed Vhuvhili SEF be acceptable and authorised, the facility will form one of two REFs which will feed into the hydrogen electrolyser at the Secunda Synfuels plant, contributing 300 MW (export capacity) of the required 500 MW.

[12] Roos, T and Wright, J., 2021, Powerfuels and Green Hydrogen (public version). European Union
[13] Ed Reed, 'Sasol signs up green hydrogen study in northwest', Energy Voice, 6 October 2021. energyvoice.com/renewables-energy-transition/hydrogen/ africa-hydrogen/354588/sasol-study-hydrogen-boegoebaai/; See the Just Transition Centre, ituc-csi.org/just-transition-centre.
[14] https://www.sasol.com/media-centre/media-releases/sasol-explore-potential-cleaner-aviation-fuels-world-class-partners
[15] Ed Reed, 'Sasol signs up green hydrogen study in northwest', Energy Voice, 6 October 2021. energyvoice.com/renewables-energy-transition/hydrogen/ africa-hydrogen/354588/sasol-study-hydrogen-boegoebaai/; See the Just Transition Centre, ituc-csi.org/just-transition-centre.
[16] Sasol to explore potential of cleaner aviation fuels with world class partners', Sasol, April 2021. sasol.com/media-centre/media-releases/sasol-explorepotential-cleaner-aviation-fuels-world-class-partners
[17] Sasol to explore potential of cleaner aviation fuels with world class partners', Sasol, April 2021. sasol.com/media-centre/media-releases/sasol-explorepotential-cleaner-aviation-fuels-world-class-partners.

The proposed Vhuvhili SEF will therefore form an integral component of the SAF production chain. Additionally, the proposed Vhuvhili SEF is intended to address the current energy shortages in South Africa and would contribute towards meeting the national energy target as set by the Department of Mineral Resources and Energy (DMRE) and will assist the South African government in achieving its proposed renewable energy targets.

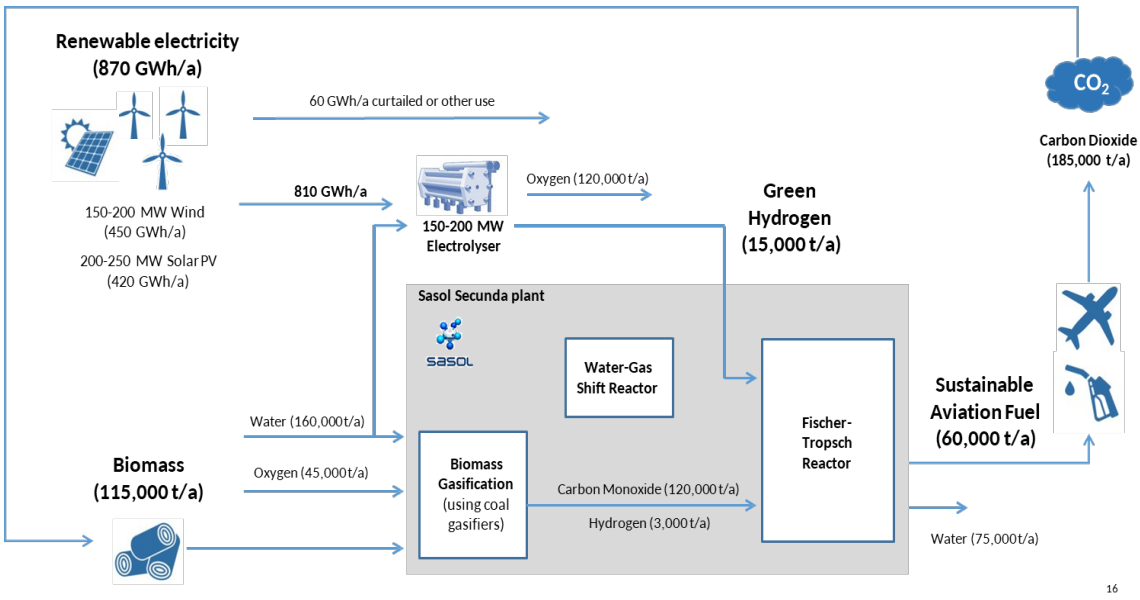


**Figure 1-5: The SAF production process and estimated outputs proposed at the Sasol Secunda Synfuels plant in Mpumalanga for bidding into the German H2Global platform (Source[18]).**

### *1.4.4. An overview South Africa's Renewable Energy Independent Power Producer Programme (REIPPPP)*

The Integrated Resource Plan (IRP) for South Africa for the period 2010 to 2030 (referred to as "IRP2010") was released by government in 2010, and an updated report was published in 2013, which proposed to secure 17 800 MW of renewable energy capacity by 2030 (including solar, wind and other energy sources). In August 2011, the Department of Energy (DoE) (currently operating as the DMRE) launched the REIPPPP and invited potential Independent Power Producers (IPPs) to submit proposals for the financing, construction, operation, and maintenance of the first 3 725 MW of onshore wind, solar thermal, PV, biomass, biogas, landfill gas or small hydropower projects. On 18 August 2015, an additional procurement target of 6 300 MW to be generated from renewable energy sources was added to the REIPPPP for the years 2021 - 2025, as published in GN 733, GG 39111. Of this, the additional target allocated for solar PV was 2 200 MW.

[18] [https://www.google.com/url?q=https://www.sasol.com/media-centre/media-releases/sasol-explore-potential-cleaner-aviation-fuels-world-class-partners&sa=D&source=docs&ust=1654098677107519&usg=AOvVaw14ZpqFoAK9s9LhCrIILINk

The most recent update to the IRP i.e., the IRP 2019, was gazetted by the Minister of Mineral Resources and Energy, Gwede Mantashe, in October 2019. The update revised the energy forecast for South Africa to the year 2030. Provision has been made for new additional capacity by 2030 including in particular 14 400 MW of wind, 6 000 MW of solar PV and 2 088 MW for storage.

Should the proposed Vhuvhili SEF be acceptable and authorised, it is considered viable that long-term benefits for the community and society in the Sasol/Secunda area would be realised. The proposed project will provide an opportunity for additional employment in an area where job creation is identified as a key priority. During the construction phase there will be approximately 200 employment opportunities over a period of 24 months. This will comprise of 30% skilled, 20% semi-skilled (Patterson B) and 50% unskilled positions. The operational phase will have fewer employment opportunities, i.e., approximately 20, but these positions will be long-term. This will comprise of 60% skilled, 25% semi-skilled (Patterson B) and 15% unskilled positions. The proposed Vhuvhili SEF project will make use of local labour as much as possible during the construction and operational phases of the proposed project. Please note these are estimated numbers of employment opportunities that may change.

Additionally, the proposed Vhuvhili SEF project is intended to address the current energy shortages in South Africa and would contribute towards meeting the national energy target as set by the DMRE and assist the government in achieving its proposed renewable energy targets if it is bid in a REIPPPP or similar bidding process.

In order to submit a bid in terms of the REIPPPP, the Project Applicant is required to have obtained an EA in terms of the 2014 NEMA EIA Regulations (as amended), as well as several additional authorisations or consents.

## 1.5 Legal Requirements for an EIA

Section 24(1) of the NEMA, states that "*In order to give effect to the general objectives of integrated environmental management laid down in this Chapter, the potential impact on the environment of listed activities must be considered, investigated, assessed and reported to the competent authority charged by this Act with granting the relevant EA*". The reference to "listed activities" relates to the regulations promulgated in Government Notice (GN) R982, R983, R984 and R985 in Government Gazette 38282, dated 4 December 2014, which came into effect on 8 December 2014. These were amended in April 2017, specifically promulgated in GN R326, R327, R325 and R324 in Government Gazette 40772, dated 7 April 2017. These EIA Regulations were further amended in Government Gazette 44701, GN R517 on 11 June 2021. However, based on the transitional arrangements, these 11 June 2021 amendments to the 2014 NEMA EIA Regulations (as amended) do not apply to applications submitted on or after 8 December 2014 and which are still pending when the amendments published in GN R517 take effect. In such cases, the applications must be dispensed with and finalised in terms of the Regulations in place at the time of submission. Therefore, the proposed Vhuvhili SEF project is being undertaken in terms of the NEMA EIA Regulations, 2014, as amended in April 2017 promulgated in GN R326, R327, R325 and R324). GN R327 and GN R324 include listed activities that trigger the need for a Basic Assessment (BA) Process, whereas GN R325 includes listed activities that trigger the need for a full S&EIA Process.

In terms of the NEMA and the NEMA EIA Regulations, 2014, as amended, a full **S&EIA process** is required for the construction of the proposed Vhuvhili SEF.

The proposed Vhuvhili SEF is not located within any of the Renewable Energy Development Zones (REDZs) gazetted in Gazette 41445, GN R114 on 16 February 2018; and Gazette 44191, GN R144 on 26 February 2021. The proposed Vhuvhili SEF is also not located within any of the strategic power corridors gazetted in Gazette 41445, GN R113 on 16 February 2018. Therefore, a full S&EIA Process is being undertaken for the proposed Vhuvhili SEF with a 107-day decision-making timeframe, as opposed to a BA process and a 57-day decision-making timeframe allowed for in the REDZs and strategic power corridors.

The need for the full S&EIA is triggered by, amongst others, the inclusion of Activity 1 listed in GN R325 (Listing Notice 2):

***"The development of facility or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facility or infrastructure is for photovoltaic installations and occurs (a) within an urban area; or (b) on existing infrastructure".***

Chapter 4 of this EIA Report contains the detailed list of activities contained in R327, R325 and R324, which may be triggered by the various project components and thus form part of the S& EIA Process.

The purpose of the S&EIA Process is to identify, assess and report on any potential impacts the proposed project, if constructed and implemented, may have on the receiving environment. The environmental assessment, therefore, needs to show the CA, what the biophysical and socio-economic impacts will be of the proposed Vhuvhili SEF. It also needs to show the CA how such impacts can be avoided, remedied, mitigated, or managed, and how positive impacts can be enhanced.

## 1.6 Project Developer

ENERTRAG South Africa (Pty) Ltd ("ENERTRAG") is a subsidiary of the German-based ENERTRAG AG, a hydrogen and renewable energy developer founded in 1992. ENERTRAG AG has an established track-record of renewable energy projects around the world, comprising over 100 wind turbines with an installed capacity of over 760 MW, and over 500 employees. Current projects are in Germany, United Kingdom, France, Poland, Bulgaria, and Belarus.

ENERTRAG AG has established itself as a Green Hydrogen Developer globally. It developed its first green hydrogen facility, Hybridkraftwerk, in Germany which is powered by wind energy. The Hybridkraftwerk was commissioned in October 2011 and produces 94 tons of hydrogen per year (Figure 1-6).

ENERTRAG South Africa (Pty) Ltd (hereafter referred to as ENERTRAG) was established in 2017, with the intention to investigate and develop clean energy projects in South Africa. ENERTRAG currently owns the Darling Wind Farm in the Western Cape and has numerous wind measurement campaigns throughout South Africa, the first IPP to commence with a wind measurement campaign in Mpumalanga. During the time of the installation of this initial wind mast, mainstream belief was that there were insufficient wind

resources in Mpumalanga for a WEF to be viable. Data from the wind measurement mast located near Hendrina in the Mpumalanga province has shown that the wind resource is viable for wind farm development in the region. Other IPPs are now following suit and securing land for REFs throughout Mpumalanga.

ENERTRAG's goal is to be a market leader in making the Just Energy Transition a reality for South Africa. It is within this context that the Developer proposes the development of the Camden and Hendrina Renewable Energy Complexes in the Mpumalanga province. These include the development of WEF and SEF projects as well as the associated development of the Camden and Hendrina Green Hydrogen and Ammonia Facilities, including grid infrastructure. These projects are subject to separate applications for EA to the relevant CAs. ENERTRAG is therefore paving the way towards a Just Energy Transition in the Mpumalanga Province.

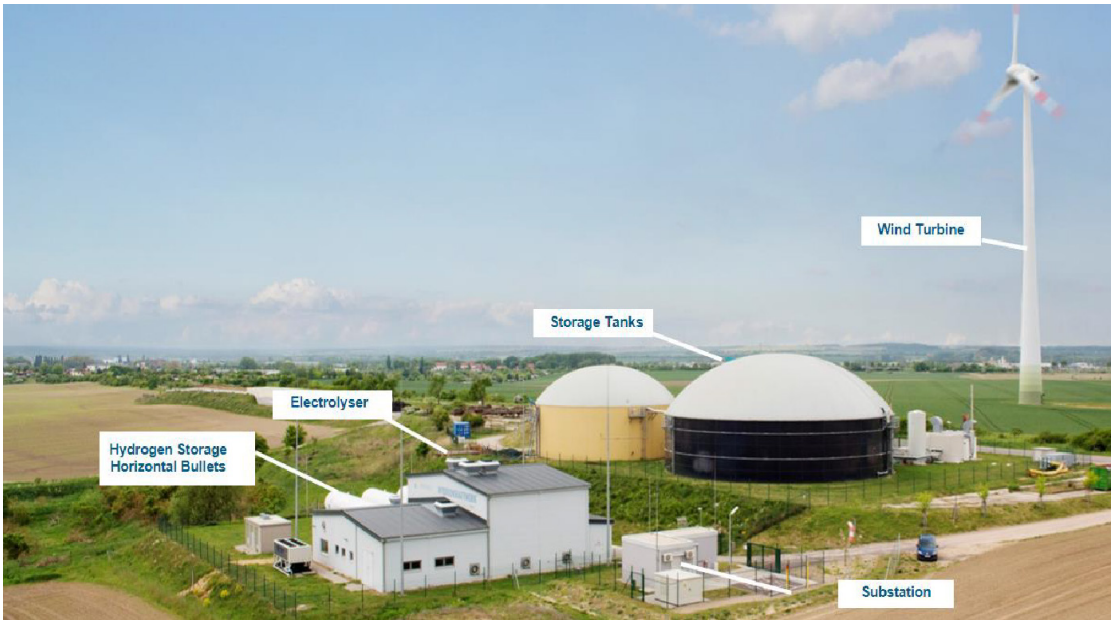


**Figure 1-6: ENERTRAG Germany's Hybridkraftwerk.**

## 1.7 Project Applicant

The Project Applicant seeking EA for the proposed Vhuvhili SEF is Vhuvhili Solar (RF) (Pty) Ltd.

## 1.8 EIA Project Team

In accordance with Regulation 12 (1) of the 2014 NEMA EIA Regulations (as amended), ENERTRAG has appointed the Council for Scientific and Industrial Research (CSIR) to undertake the S&EIA Process to determine the potential biophysical, social and economic impacts associated with the proposed project, and to identify how such negative impacts can be avoided, remedied, mitigated or managed; and how positive impacts can be enhanced. Public participation forms an integral part of the Scoping and EIA Process and assists in identifying issues and possible alternatives to be considered. The CSIR is also undertaking the

Public Participation Process (PPP) for this S&EIA Process. Details on the PPP are included in Chapter 4 of this Draft EIA Report

The project team, which is involved in this S&EIA Process, is listed in Table 1-3 below. This team includes several specialists who have extensive experience in conducting specialist studies for REFs in South Africa.

**Table 1-3: The EIA Project Team**

| NAME | ORGANISATION | ROLE/STUDY TO BE UNDERTAKEN |
|---|---|---|
| ***Environmental Management Services (CSIR)*** | | |
| Paul Lochner *(Registered EAP (2019/745))* | CSIR | EAP, Reviewer, Technical Advisor and Quality Assurance |
| Minnelise Levendal (*Pr.Sci.Nat.)* | CSIR | Project Manager |
| Dhiveshni Moodley *(Cand.Sci.Nat.)* | CSIR | GIS specialist |
| Willan Adonis | CSIR | Project Officer |
| Helen Antonopoulus | CSIR | Project Officer |
| Suvasha Ramcharan | CSIR | Project Officer |
| ***Specialists*** | | |
| Johann Lanz (*Pr.Sci.Nat.)* | Private | Agriculture and Soils Assessment |
| Dr Noel van Rooyen *(Pr.Sci.Nat.)* | Ekotrust cc | Terrestrial Biodiversity and Species Impact Assessment |
| Lorainmari den Boogert (Pr.Sci.Nat.), Antoinette Bootsma Nee van Wyk (Pr.Sci.Nat.), Rudi Bezuidenhoudt (Pr.Sci.Nat.) and André Strydom | Iggdrasil Scientific Services & Limosella Consulting | Aquatic Biodiversity and Species Impact Assessment |
| Chris van Rooyen and Albert Froneman (*Pr.Sci.Nat.)* | Chris van Rooyen Consulting | Avifauna Impact Assessment |
| Kerry Schwartz | SiVEST SA (Pty) Ltd | Visual Impact Assessment |
| Dr Jayson Orton | ASHA Consulting (Pty) Ltd | Heritage Impact Assessment (Archaeology and Cultural Landscape) |
| Professor Marion Bamford | Private | Palaeontology Site Sensitivity Verification Report |
| Tony Barbour | Tony Barbour Environmental Consulting | Socio-Economic Impact Assessment |
| Adrian Johnson | JG Afrika (Pty) Ltd | Traffic Impact Assessment |
| Bulala Khuthadzo (Pr.Sci.Nat.) | WSP GOLDER | Geotechnical Desktop study |
| Paul Lochner (EAP), Helen Antonopoulus, Lizande Kellerman (Pr.Sci.Nat.) and Minnelise Levendal (Pr.Sci.Nat.) | CSIR | Civil Aviation Site Sensitivity Verification |
| Paul Lochner (EAP), Helen Antonopoulus, Lizande Kellerman (Pr.Sci.Nat.) and Minnelise Levendal (Pr.Sci.Nat.) | CSIR | Defence Site Sensitivity Verification |

| NAME | ORGANISATION | ROLE/STUDY TO BE UNDERTAKEN |
|---|---|---|
| Debbie Mitchell *(Pr Eng)* | Ishecon cc | Battery Storage High Level Safety, Health, and Environment Risk Assessment |

It is important to note that the Risk Assessment undertaken by ISHECON is a technical study and serves to inform the layout, mitigation, and management requirements of the proposed SEF (as required) and does not constitute a specialist study in terms of Appendix 6 of the NEMA EIA Regulations, 2014, as amended.

The list of specialist studies was discussed with the CA, the Mpumalanga DARDLEA, at the pre-application meeting held on 23 May 2022 (Appendix F). DARDLEA confirmed that they agree with the proposed specialist studies but questioned why a Geotechnical study was not being undertaken as it was identified as a required study in the National DFFE Screening Tool. The applicant subsequently appointed a specialist to undertake a Geotechnical Impact Assessment which is included in Chapter 14 of this report.

## 1.9 Details and Expertise of the CSIR EIA Project Management Team

This section provides information on the expertise of the CSIR EIA Project Management Team and EAPs.

**Paul Lochner (EAP, Technical Advisor and Quality Assurance):**

Paul Lochner is an EAP at the CSIR in Stellenbosch, with 30 years of experience in a wide range of environmental assessment and management studies. Paul commenced work at CSIR in 1992, after completing a B.Sc. degree in Civil Engineering and a Masters in Environmental Science, both at the University of Cape Town. His initial work at focused on wetlands and estuarine management; environmental engineering in the coastal zone; and coastal zone management plans. Since 2008, Paul has been the leader and manager of the Environmental Management Services (EMS) group within CSIR that has been at the forefront of advancing environmental assessment in South Africa. This group currently consists of approximately 10 environmental scientists, planners and engineers, with offices in Stellenbosch, Cape Town and Durban. Paul's particular experience is in environmental planning and assessment for renewable energy, EGI, desalination, oil and gas, wetlands and coastal zone management, and industrial and port development. He has been closely involvement in the research and application of Strategic Environmental Assessment (SEA) in South Africa, and also has wide experience in Environmental and Social Impact Assessment, Environmental Management Programmes (EMPRs) and Environmental Screening Studies. He has been the project leader for over 40 SEAs and EIAs. He also served as project leader for a suite of SEAs commissioned by the DFFE from 2014 to 2020. Paul is a Registered EAP (2019/745) with the Environmental Assessment Practitioners Association of South Africa (EAPASA).

**Minnelise Levendal *Pr. Sci. Nat*. (Project Manager):**

Minnelise is a Senior EAP in the EMS Group of the CSIR and holds a Masters degree in Botany from the Stellenbosch University. She obtained her BSc (Education) and BSc (Honours) degrees at the University of the Western Cape. She has 15 years of experience in Environmental Management (which includes five years working as a case officer at the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP). Minnelise is currently managing various EIAs and BAs for wind and solar renewable energy projects in South Africa. She was the project manager of ten BAs for wind monitoring masts in South

Africa as part of the National Wind Atlas Project of the Department of Energy (DoE). EAs for all the ten masts were obtained from DEA in 2010. Minnelise managed the Special Needs and Skills Development Programme of DEA (from 2014 to 2018) which provided *pro bono* environmental assessments (BAs) to applicants with special needs, i.e., applicants who do not have the financial means to appoint an EAP to undertake a BA for their small-scale projects. Under this programme, 30 BAs have been undertaken and received EA.

Minnelise is registered as a Professional Natural Scientist (117078) with the South African Council for Natural Scientific Professions (SACNASP).

**Dhiveshni Moodley *Cand.Sci.Nat* (Project Officer and GIS Specialist):**

Dhiveshni Moodley is a Junior EAP in the EMS group of the CSIR. Dhiveshni holds a BSc, BSc Honours (cum laude) and MSc (cum laude) degrees in Environmental Science from the University of KwaZulu-Natal. She has three year's work and research experience in flood risk, hydropedological- and wetland functional assessment specialist studies, as well as conducting BAs and Scoping/EIAs in the Renewable Energy sector. Her key interest lies in using GIS analyses to apply the formation of accurate, feasible solutions to complex environmental challenges.

Dhiveshni is registered as a Candidate Natural Scientist with the SACNASP (1472997/19).

**Willan Adonis (Project Officer):**

Willan Adonis is an environmental consultant in training in the CSIR's EMS group. Willan holds a BA, a PGDip and an MPhil (all Cum Laude) in Development and Environmental Management from Stellenbosch University. After completing his masters, he gained experience in on-site compliance monitoring, assisted with BA reports, compiled EMPRs, and undertook several public participation processes. His key interest lies in how the multi-disciplinary interfaces between Environmental, Social and Governance systems can be used to build stakeholder partnerships and promote sustainable human-environment relationships.

**Helen Antonopoulos (Project Officer):**

Helen Antonopoulos is an intern EAP in the EMS group of the CSIR and holds BSc, BSc Honours, and MSc degrees in Environmental and Geographical Science from the University of Cape Town. She has assisted with compiling EA applications for WEFs in the Western Cape, as well as BA and Scoping Reports for Solar Facilities in the Northern Cape. She is interested in using renewable energy projects to promote sustainable development in South Africa.

**Suvasha Ramcharan (Project Officer):**

Suvasha Ramcharan is an Environmental Scientist Intern in the Environmental Management Services group at the CSIR in Durban. Suvasha holds a BSc, BSc Honours, and MSc (cum laude) degrees in Environmental Science from the University of KwaZulu-Natal. She has assisted with compiling EA applications for WEF and EGI projects in the Western Cape, Scoping Reports for WEF projects in the Eastern Cape as well as EMPrs for a Solar PV project in Mpumalanga. She has a keen interest in working on environmental impact

assessment projects to help mitigate and manage human impacts on the environment so that current natural resources and biodiversity can be safeguarded for the benefit of future generations.

## 1.10 Need and Desirability

It is an important requirement in the EIA Process to review the need and desirability of the proposed project. Guidelines on Need and Desirability were published by the DEA (now operating as the DFFE) in 2017[19]. These guidelines list specific questions to determine need and desirability of proposed developments. This checklist is a useful tool in addressing specific questions relating to the need and desirability of a project and assists in explaining that need and desirability at the provincial and local context. Need and desirability answer the question of whether the activity is being proposed at the right time and in the right place.

Table 1-4 includes a list of questions based on the DFFE's Guideline to determine the need and desirability of the proposed project. It should be noted that this table is informed by the outcomes of the S&EIA Process and will be updated once the are completed in the EIA Phase.

[19] DEA (2017), Guideline on Need and Desirability, Department of Environmental Affairs (DEA), Pretoria, South Africa. ISBN: 978-0-9802694-4-4.

**Table 1-4: The Guideline on the Need and Desirability's list of questions to determine the "Need and Desirability" of a proposed project**

| NEED | |
|---|---|
| **Question** | **Response** |
| **1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?** | |
| **1.1. How were the following ecological integrity considerations taken into account?:**<br><br>**1.1.1. Threatened Ecosystems,**<br>**1.1.2. Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure,**<br>**1.1.3. Critical Biodiversity Areas ("CBAs") and Ecological Support Areas ("ESAs"),**<br>**1.1.4. Conservation targets,**<br>**1.1.5. Ecological drivers of the ecosystem,**<br>**1.1.6. Environmental Management Framework,**<br>**1.1.7. Spatial Development Framework, and**<br>**1.1.8 Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.).** | The environmental sensitivities, in particular the aquatic and terrestrial biodiversity and ecological sensitivities, present within the study area have been assessed within the Terrestrial Biodiversity and Aquatic Biodiversity Assessments which are included in Chapters 7 and 8 respectively.<br><br>The specialists identified terrestrial and aquatic biodiversity sensitive areas on site that should be avoided by the proposed development, as well as any other ecologically sensitive areas and how to suitably develop within these areas so that the ecological integrity of the areas is maintained.<br><br>These findings have informed the revised project layout which is included in the Conclusions (Chapter 19) of this EIA Report.<br><br>The Terrestrial Biodiversity Specialist study concludes:<br>● Protected Areas: The study area is not located in a protected area.<br>● National Protected Areas Expansion Strategy (NPAES): The development will not interfere with the protected areas expansion strategy according to the NPAES spatial data of 2010.<br>● Critical Biodiversity Areas (CBAs): The PV layout taken into the EIA phase included some areas of panels within areas designated as CBAs on the national database. These areas were ground-truthed by the specialists and found to be of low sensitivity. These areas are currently used for cattle grazing. |

| NEED | |
|---|---|
| **Question** | **Response** |
| | • Ecological Support Areas (ESAs): There are no ESAs within the boundary of the Vhuvhili SEF site.<br>• Freshwater Ecosystem Priority Area (FEPA): Although the entire site is classified as an upstream management area, the site assessment of the vegetation and the application of a sensitivity model rated most of the river FEPA area as being of low to medium sensitivity, with only the drainage lines having a high sensitivity. The wetland FEPAs were largely incorporated into the delineation of the CBAs (see above bullet).<br><br>The specialist noted that in terms of an ecological point of view large portions of the site have been heavily modified. In terms of ecological processes, function and drivers the specialist noted overall that it is unlikely that the development will contribute to the disruption of broad-scale ecological processes such as dispersal, migration or the ability of fauna to respond to fluctuations in climate or other conditions.<br><br>Based on the terrestrial Mpumalanga Biodiversity Sector Plan (MBSP) the majority of the site is classified as CBA 1 with medium to large areas classified as heavily or moderately modified.<br><br>The revised sensitivity map is included in Chapter 3 and Chapter 19 of this EIA Report. The sensitivity map is informed by the sensitivities identified by the specialists. The Terrestrial Biodiversity specialist noted that the wetland habitat (Habitat 7) was rated as highly sensitive in the current assessment. A small section of the layout was updated to avoid Habitat 7. |

| NEED | |
|---|---|
| **Question** | **Response** |
| **1.2. How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?** | Detailed Terrestrial Biodiversity and Aquatic Assessments were undertaken and are included Chapters 7 and 8 respectively in the EIA Report.<br><br>Based on the screening, assessment and fine scale mapping that was done for the site, the specialists confirmed that the site falls mostly within moderately to heavily modified areas with parts of the proposed Vhuvhili SEF layout mapped as CBA but ground-truthed to be of low sensitivity. The Terrestrial Biodiversity and Aquatic specialists have also identified all ecological sensitive areas, including appropriate buffer zones, on site that should be avoided by the proposed development and propose mitigation measures to reduce or minimise impacts to ensure that the ecological integrity of the areas is maintained.<br><br>The Vhuvhili SEF layout was updated to avoid the rocky outcrops (Habitat 3), which has a medium sensitivity and one of the drainage lines with a high sensitivity (Habitat 7). The solar infrastructure in the east of the project areas was also repositioned to avoid the high sensitivity drainage lines.<br><br>The following buffers are proposed by the Aquatic specialist and have been adhered to in the updated layout:<br><br>● Floodplain Wetlands – 37 m<br>● Channelled Valley Bottom Wetlands – 56 m<br>● Unchannelled Valley Bottom Wetlands – 50 m<br>● Seepage Wetland – 54 m<br><br>The combined sensitivity map is included in Chapter 19 of this EIA Report<br>The Terrestrial and Aquatic Biodiversity specialists identified all ecological sensitive areas on site that should be avoided by the proposed development and propose |

| NEED | |
|---|---|
| **Question** | **Response** |
| | mitigation measures to reduce or minimise impacts to ensure that the ecological integrity of the areas is maintained.<br><br>Further measures to avoid, remedy, mitigate and manage impacts are included in the Environmental Management Programme (EMPr) that was compiled and included in Part C of this EIA Report. |
| **1.3. How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?** | Measures to avoid, remedy, mitigate or manage biophysical impacts are included in the EMPr. The EMPr is included in Part C of this EIA Report. |
| **1.4. What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether; what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?** | Waste will mostly be generated during the construction and decommissioning phases of the project. Measures to avoid, remedy, mitigate or manage waste are included within the EMPr included within the EIA Report. The EMPr is included within Part C of this EIA Report. Waste generated on site will be disposed of at an appropriately licenced landfill site (i.e., a landfill that is licenced to handle the specific type of waste disposed of from the site). |
| **1.5. How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?** | An integrated Heritage Impact Assessment (HIA) was undertaken to assess potential archaeological, palaeontological and cultural impacts resulting from the proposed development. Please refer to Chapter 11 of this EIA Report for the full HIA. The HIA concluded that all known significant heritage resources (aside from the visual landscape) can be avoided by the proposed updated Vhuvhili SEF layout through the implementation of recommended mitigation measures. These are detailed in Sections D.2.3 and D.2.4 and translated into the EMPr (Part C of the EIA report).<br><br>The integrated Heritage Impact Assessment (Archaeology, Cultural Landscape and Palaeontology) was submitted to SAHRA and MPHRA for consideration and |

| NEED | |
|---|---|
| **Question** | **Response** |
| | comment. Comments were obtained from these stakeholders during the Scoping phase and are included in Appendix D in Part B of this EIA Report. |
| **1.6. How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?** | Measures to avoid, remedy, mitigate or manage biophysical impacts are included in the EMPr. The EMPr is included as Part C of this EIA Report. |
| **1.7. How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?**<br><br>**1.7.1. Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e., de-materialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life)** | South Africa is among the world's top 10 developing countries required to significantly reduce their carbon emissions, and the introduction of low carbon-emitting technologies into the country's complement of power generation will greatly facilitate achieving this important objective. Given that South Africa receives among the highest levels of solar radiation on earth, it is clear that solar power generation should feature prominently in future national efforts to convert to a more sustainable suite of energy production to combat human-induced climate change.<br><br>South Africa has heavily relied on coal as a source of electricity for decades. Due to the nature of coal as a non-renewable resource that causes major environmental degradation, there is therefore a need to identify alternative resources that could promote sustainable energy sources as well as cleaner energy production mechanisms. The electricity produced by the proposed Vhuvhili SEF project will be transferred from the on-site substation at the Vhuvhili SEF site to the switching station at the proposed Mukondeleli WEF. From here, the combined renewable |

| NEED | |
|---|---|
| **Question** | **Response** |
| **1.7.2. Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e., what are the opportunity costs of using these resources of the proposed development alternative?)**<br>**1.7.3. Do the proposed location, type and scale of development promote a reduced dependency on resources?** | energy produced by the two facilities will be transmitted to Sasol's Secunda facility for the production of green-hydrogen and green aviation fuel. Firstly, this project is seen as supporting a source of 'clean energy' in terms of solar energy production and therefore reduces the dependence on non-renewable sources. Secondly, it supports the transition to low-carbon energy sources. Green hydrogen has been identified as a low-carbon solution to meet Greenhouse Gas (GHG) emission reduction targets as contemplated in international agreements (e.g. the 2015 United Nations Paris Agreement) and to power industries in which emissions have previously been difficult to abate. Hydrogen is also used in various industrial processes, such as ammonia production, and thus has the potential to contribute to decarbonising a variety of industries, including the agricultural industry which is vital for food security.<br><br>In October 2021, at the second Sustainable Infrastructure Development Symposium, President Cyril Ramaphosa stated that green energy had the potential to drive industrialisation and establish a whole new industrial reality. Furthermore, the President stated that "We stand ready to be a major exporter in this market, to use hydrogen to rapidly decarbonise our existing industries, and attract industrial investment from across the globe seeking to meet new standards of green power in the production process". The proposed development of the Vhuvhili SEF directly addresses the President's statements and the need to implement renewable energy technologies and green fuels and/or products in Mpumalanga. The project also represents a move by Sasol to transition to the production of greener energy sources, which will additionally create business and employment resilience in the energy production industry.<br><br>The proposed project is a sustainable option for the area and the final updated proposed layout will avoid all areas of high and very high environmental sensitivity. Where impacts to medium sensitivity areas cannot be avoided, potential impacts |

| NEED | |
|---|---|
| **Question** | **Response** |
| | to the receiving environment will be appropriately minimised, mitigated or managed. |
| **1.8. How were a risk-averse and cautious approach applied in terms of ecological impacts?:**<br><br>**1.8.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?**<br>**1.8.2. What is the level of risk associated with the limits of current knowledge?**<br>**1.8.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?** | The precautionary approach has been adopted for this study, i.e., assuming the worst-case scenario will occur and then identifying ways to mitigate or manage these impacts. This include a maximum height of 6 m for the solar PV panels that was assessed by the specialists. In addition, a buffer of 100 m is proposed around the on-site substation alternatives. This allows for the substation to be located/ micro-sited outside of highly sensitive areas as verified by the specialist team, such as graves and buffer areas identified by the heritage specialist. |

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| **1.9. How will the ecological impacts resulting from this development impact on people's environmental right in terms following:**<br><br>**1.9.1. Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?**<br>**1.9.2. Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?** | A detailed Socio-Economic Impact Assessment was conducted as part of the S&EIA Process undertaken for the proposed Vhuvhili SEF and is included in Chapter 13 of this EIA Report. Linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area were considered as part of the Socio-Economic Impact Assessment.<br><br>The assessment concluded that the proposed Vhuvhili SEF project has acceptable socio-economic impacts and desirable benefits related to economic growth and employment, financial contributions to and upliftment of rural local communities and increased, more secure power generation capacity for South Africa's energy complement.<br><br>As discussed, the proposed the proposed Vhuvhili SEF will supply energy to the Sasol Secunda facility for the production of green hydrogen and green aviation fuel. What makes green hydrogen 'green' is the input of energy from a renewable energy source (e.g., solar or wind energy) to operate the electrolyser – the key component in the green hydrogen production process. With the use of a dedicated renewable energy facility to produce 'green' hydrogen at the Sasol Secunda facility, it offsets the need to use electricity from the national electricity grid. In this manner, the proposed Vhuvhili SEF indirectly makes available an increased electricity availability on the national grid which can be used for improved service delivery to communities, and indirectly reduces the probability of load shedding and the many socio-economic costs of such outages.<br>The proposed Vhuvhili SEF will therefore contribute toward the realisation of the socio-economic benefits identified during the detailed Socio-Economic Impact Assessment.<br>Linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area will be considered as part of the Socio-Economic Assessment undertaken for this project and will be included within the EIA Report. |
| **1.10. Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?** | |

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| **1.11. Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives / targets / considerations of the area?** | The impacts on ecological integrity objectives of the area were considered as part of the Terrestrial Biodiversity and Aquatic Biodiversity Assessments undertaken for this project and have been included in Chapters 7 and 8 of this EIA Report. The specialists recommended measures to maintain the ecological receiving environment; these measures have been translated into the EMPr (Part C of this EIA Report) for implementation on site. |
| **1.12. Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?** | Please refer to Chapter 5 of this EIA Report where the alternatives are discussed, including the preferred alternatives considered as part of the EIA process. |
| **1.13. Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?** | Each specialist assessment has taken into consideration and has assessed the potential cumulative impacts of this proposed development. Please refer to Chapters 6-15 of this EIA Report for the specialist reports where the potential cumulative impacts are discussed for this project. |
| **2.1. What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?:** | |
| **2.1.1. The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area,** | The Vhuvhili SEF is entirely located in the Govan Mbeki Local Municipality (GMLM) and the Gert Sibanda District Municipality (GSDM) within the Mpumalanga province.<br><br>Both the GMLM and the GSDM Integrated Development Plans (IDPs) (2021/2022), recognise renewable energy projects as potential sustainable economic development opportunities. The proposed project will therefore be supportive of the GMLM's IDP priority areas of facilitating job creation to address the high unemployment rate (Objective 3), investing in infrastructure development |

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| | (Objective 2 and 6) and promoting financial sustainability in the municipality (Objective 1) while protecting the environment (Objective 5).<br><br>The IDP highlights the renewable energy sector as a technical service that can be provided to support the workforce in delivering on the strategic objectives. The IDP notes that this objective can be achieved through the phasing in of renewable energy options, which include concentrated solar power, wind and natural gas thereby reducing its dependence on coal resources. Although solar PV is not specifically listed as a renewable energy option, it shows that the municipality is supporting green energy initiatives to diversify local economic development. The proposed Vhuvhili SEF project is expected to create employment opportunities and economic spin offs during the construction and operational phases (if EA is granted by the Mpumalanga DARDLEA). The Vhuvhili SEF would help to address the need for sustainable economic growth by leveraging competitive advantages of the region, in terms of harnessing the characteristic high solar resource in the area to generate renewable electricity. The proposed project will also help to address the need to improve basic service delivery and infrastructure development through increased electricity supply while also providing advanced skills transfer and training to the local communities and creating contractual and permanent employment in the area. This will also address unemployment and poverty as well as Climate Change which have been identified as “Threats” in the SWOT analysis which was undertaken as part of the GMLM IDP process.<br><br>One of the economic priority issues identified within the GMLM IDP (2022-2027) is the fairly high level of unemployment and poverty. The expanded unemployment rate of Govan Mbeki was 32.5% in 2020, and youth unemployment was 45%. These unemployment rates are one of the lower unemployment rates in the province, but still relatively high in comparison with the 6% target by 2030. |

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| | In the Govan Mbeki LM, the mining sector (39%) and manufacturing sector (24%) contributes the most in terms of GDP. In the SWOT analysis undertaken as part of the IDP process, one of the threats identified is the closure of the Mining and the Petro-chemical industry. It notes that "coal is a finite resource and exhausting coal deposits, and reserves means Govan Mbeki will become a ghost town with very high unemployment, poverty and poor living conditions".<br><br>The proposed project will create job opportunities and economic spin offs during the construction and operational phases (if an EA is granted by the Mpumalanga DARDLEA). Additionally, the proposed project will improve the resilience of the local economy which has come to depend on coal mining which the IDP recognises as a finite resource and a vulnerability of the local economy. Therefore, the proposed project would help to address the need for increase local economic resilience while also providing advanced skills transfer and training to the local communities and creating contractual and permanent employment in the area. The proposed project will therefore be supportive of numerous of the GMLM's IDP objectives and is, therefore, needed and desirable. |
| **2.1.2. Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),** | This is not applicable as the proposed project is a renewable energy project and the site is zoned for agricultural use. |
| **2.1.3. Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.)** | The current land use on the proposed site is agriculture, predominantly grain farming. Only soil that is not suitable for grain production is used for cattle grazing<br><br>The impact of the proposed project on cultural or heritage areas (i.e., archaeology) was assessed as part of the HIA (Chapter 11 of this EIA Report).<br><br>In terms of palaeontology, the specialist assessment (Chapter 12) states that since the site visit by the archaeologist for this project confirmed that the land has been |

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| | ploughed and planted in the last few decades, it is unlikely that any fossils will be seen before excavations commences.<br><br>Should the proposed Vhuvhili SEF project proceed, approximately 650 hectares of the land will be developed on, and it is not expected that this will significantly threaten the agricultural activities present on site. An Agricultural Assessment has been included in Chapter 6 of the EIA Report. The Assessment considers the impact of the proposed project in terms of the land capability and agricultural potential. As noted in Chapter 6:<br>● The layout of the facility has been deliberately designed to avoid all field crops on the farm. The proposed development will therefore only occupy land that is of limited land capability and which is not suitable for crop production. There is not a scarcity of such agricultural land in South Africa and its conservation for agriculture is therefore not a priority.<br>● The amount of agricultural land loss is within the allowable development limits prescribed by the agricultural protocol. These limits reflect the national need to conserve valuable arable land and therefore to steer, particularly renewable energy developments, onto land that is not suitable for crop production<br><br>A detailed Visual Impact Assessment (VIA) is included in Chapter 10 of this EIA Report. According to the VIA, the current land use and cultural landscape is largely an agricultural one characterised by grazing lands (grass) and arable croplands. The VIA notes that the study area has a somewhat mixed visual character, transitioning from the heavily transformed urban / peri-urban landscape associated with the Secunda and Trichardt urban areas, the Sasol Secunda synthetic fuel plant (refinery) and associated infrastructure in the north / north-west to a more rural / pastoral character across the remainder of the study area. Hence, although a solar PV development would alter the visual character and contrast with this rural / |

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| | pastoral character, the location of the proposed SEF in relatively close proximity to Secunda and Trichardt and the Sasol fuel plant will significantly reduce the level of contrast.<br><br>There are no scenic routes in the area, although the N17 runs west to east about 8.5 km north of the north-eastern end of the study area. Given the visual intrusions of the industrial features in the area, the scenic landscape is of no further concern. It is rated as having low cultural significance at the local level.<br><br>As noted, an EMPr was compiled for the proposed project to ensure that all potential negative impacts identified are suitably managed and mitigated, and potential positive impacts are enhanced. |
| **2.1.4. Municipal Economic Development Strategy ("LED Strategy").** | According to the GMLM LED Strategy 2014 and beyond, new energy sources (preferably renewable energy such as solar and wind) represent a key side linkage to complement the coal mining and fuel production economic activities of the local economy. It is recognised that such side linkages, or diversifying of the local economy, will provide great opportunities for further economic development of the municipality. The proposed project to develop the Vhuvhili SEF aligns with the above objective of the GMLM LED Strategy. Furthermore, renewable energy development is earmarked as a catalytic Rural Economic Sector Development Programme and as a municipal industrialisation anchor programme. Secunda is earmarked as a proposed location for the implementation of these programmes within the municipal LED Strategy. Therefore, the proposed development of the Vhuvhili SEF aligns with the GMLM LED Strategy. The LED Strategy and its alignment with the proposed Vhuvhili was also considered in the Socio-Economic Impact Assessment (Chapter 13 of the EIA Report). |

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| **2.2. Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?**<br><br>**2.2.1. Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?** | See response to Need and Desirability question 2.1.1 and question 2.1.4, above. The socio-economic impacts are assessed in the Socio-Economic Assessment (Chapter 13 of the EIA Report). The LED Strategy and its alignment with the proposed Vhuvhili was also considered in the Socio-Economic Impact Assessment (Chapter 13 of the EIA Report). |
| **2.3. How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?** | The needs and interests of the relevant communities were addressed in detail in the Socio-Economic Impact Assessment which is included in Chapter 13 of the EIA Report. Issues raised by I&APs to this effect will be addressed in the relevant Comments and Responses Report which will be included in the Final EIA Report.<br>The Vhuvhili SEF project will improve economic development and resilience in the municipality, provide new permanent and temporary employment opportunities as well as improve the resilience of current employment industries in the municipality (e.g., Sasol Secunda Synfuels facility). Therefore, the proposed Vhuvhili SEF project will contribute toward addressing the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities should construction materialise. Further to this, detailed discussion of the proposed project's alignment with the local and district municipal IDPs and the local municipality's LED Strategy is provided in the responses to Need and Desirability question 2.1.1 and question 2.1.4, above. This is also discussed in the Socio-Economic Impact Assessment that is included in Chapter 13 of this EIA Report. |
| **2.4. Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long term? Will the impact be socially and economically sustainable in the short- and long-term?** | The equitable (intra- and inter-generational) impact distribution, in the short- and long term and economical sustainability was addressed in the detailed Socio-Economic Impact Assessment that is included in Chapter 13 of this EIA Report. The proposed Vhuvhili SEF will contribute toward addressing the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities which will contribute to realising a low-carbon energy future |

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| | for the local municipality, the Mpumalanga province and South Africa more broadly. The proposed project therefore helps to address climate change, and hence it promotes intra- and inter-generational equity. |
| **2.5. In terms of location, describe how the placement of the proposed development will:** | |
| **2.5.1. result in the creation of residential and employment opportunities in close proximity to or integrated with each other,** | Local employment opportunities will be provided as far as possible. Where possible, the construction of the proposed Vhuvhili SEF will utilise contractors who employ labourers from the local community and therefore encourage socio-economic development at a local scale, as is encouraged under the GMLM LED Strategy, 2014 and beyond. Approximately 200 and 20 employment opportunities will be generated during the construction and operational phases, respectively. |
| **2.5.2. reduce the need for transport of people and goods,** | This is not applicable as the proposed project is located within a rural area and the development site is zoned for agricultural use. In addition, this project is proposed for the generation of electricity from a renewable energy facility. |
| **2.5.3. result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport),** | This is not applicable as the proposed project is located within a rural area and the site is zoned for agricultural use. In addition, this project is proposed for the generation of electricity from a renewable energy facility. |
| **2.5.4. compliment other uses in the area,** | The Agricultural Assessment (Chapter 6 of this EIA Report) notes that the proposed development will only occupy land that is of limited land capability and which is not suitable for crop production. There is not a scarcity of such agricultural land in South Africa and its conservation for agriculture is therefore not a priority. It states that the amount of agricultural land loss is within the allowable development limits prescribed by the agricultural protocol. The Agricultural Assessment concludes that the agricultural impact (loss of future agricultural production potential) resulting from the proposed Vhuvhili SEF is totally insignificant in the context of the agricultural environment. The proposed development is therefore acceptable. This is substantiated by the facts the proposed development poses a very low risk in |
| **2.5.5. be in line with the planning for the area,** | |

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| | terms of causing soil degradation, and the development offers some positive impact on agriculture as well as wider, societal benefits.<br><br>The VIA (Chapter 10 of the EIA Report) notes that the study area has a somewhat mixed visual character, transitioning from the heavily transformed urban / peri-urban landscape associated with the Secunda and Trichardt urban areas, the Sasol Secunda synthetic fuel plant (refinery) and associated infrastructure in the north / north-west to a more rural / pastoral character across the remainder of the study area.<br><br>Further to this, the proposed project aligns with the strategic planning for the area in terms of renewable energy development plans as contemplated in the local and district municipal IDPs and the local municipality's LED Strategy. A detailed analysis of this strategic alignment is provided in the responses to Need and Desirability question 2.1.1 and question 2.1.4, above. |
| **2.5.6. for urban related development, make use of the underutilised land available with the urban edge,** | This is not applicable as the proposed project is located within a rural area and the site is zoned for agricultural use. |
| **2.5.7. optimise the use of existing resources and infrastructure,** | The proposed Vhuvhili SEF will transfer electricity from its proposed on-site substation to the switching station at the proposed Mukondeleli WEF wherefrom the electricity will be fed into the existing step-down substation and electrical grid at Sasol. The electricity will be used for the production of green hydrogen and green aviation fuel. Therefore, existing infrastructure will be used at Sasol as far as possible. As far as reasonably possible and available, existing servitudes will be utilised in accordance with the Eskom Distribution Guide Part 19: Building Line Restrictions, Servitude Widths, Line Separations and Clearances from Power Lines. The potential to use existing servitudes of Sasol will be determined during the detailed engineering phase, subsequent to the issuing of EA, should such authorisation be granted for the proposed power line and EGI project which is |

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| | subject to a separate BA process which is currently being undertaken by the Project Applicant. |
| **2.5.8. opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),** | The project is proposed for the generation of electricity from a renewable energy source and is not related to bulk infrastructure expansion. |
| **2.5.9. discourage "urban sprawl" and contribute to compaction/densification,** | This issue is addressed in the Socio-Economic Impact Assessment that was undertaken and which is included in the Chapter 13 of the EIA Report. The proposed Vhuvhili SEF will generate electricity for use by an existing economically important industry in Secunda. Such large-scale renewable energy facilities is an uncommon urban activity as they are generally incompatible for location within the urban edge.<br><br>According to the Visual Impact Assessment and the Integrated Heritage and Cultural Landscape Impact Assessment (Chapters 10 and 11, respectively), the landscape is not particularly sensitive from a cultural viewpoint and is compromised by the very large Sasol facility located only 6 km west of the study area, and several coal mines in the surrounding landscape. There are numerous existing power lines within the study area. The proposed project will therefore not be inconsistent with the industrial development of the surrounding landscape. |
| **2.5.10. contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs,** | This is not applicable as the proposed project is located within a rural area and the site is zoned for agricultural use. |
| **2.5.11. encourage environmentally sustainable land development practices and processes,** | The development of a renewable energy facility is a sustainable land development practice provided it is constructed and operated in an environmentally friendly manner. |
| **2.5.12. take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.),** | Please refer to Chapter 5 of this EIA report for a description of the process undertaken to identify the site as a preferred site/alternative for the development of the proposed Vhuvhili SEF. |

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| **2.5.13. the investment in the settlement or area in question will generate the highest socio-economic returns (i.e., an area with high economic potential),** | This was addressed in the detailed Socio-Economic Impact Assessment that was undertaken for the proposed Vhuvhili SEF (Chapter 13 of the EIA Report). This study assessed and considered the project's alignment with the local strategic planning objectives in terms of renewable energy development plans as contemplated in the local and district municipal IDPs and the local municipality's LED Strategy. A detailed analysis of this strategic alignment is provided in the responses to Need and Desirability question 2.1.1 and question 2.1.4, above. The socio-economic benefits of the project are included and assessed in the Socio-Economic Impact Assessment that is included in Chapter 13 of the EIA Report. |
| **2.5.14. impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and** | The impact of the proposed project on cultural areas and heritage resources (archaeology and palaeontology), as well as on the sense of place were assessed in the HIA and the VIA (sense of place) which are included respectively in Chapters 10 and 11 of the EIA Report.<br><br>A VIA is included in Chapter 10 of this EIA Report. The visual study notes that the study area has a somewhat mixed visual character, transitioning from the heavily transformed urban / peri-urban landscape associated with the Secunda and Trichardt urban areas, the Sasol Secunda synthetic fuel plant (refinery) and associated infrastructure in the north / north-west to a more rural / pastoral character across the remainder of the study area. Hence, although a solar PV development would alter the visual character and contrast with this rural / pastoral character, the location of the proposed Vhuvhili SEF in relatively close proximity to Secunda, Trichardt and the Sasol fuel plant will significantly reduce the level of contrast. Therefore, the cultural landscape has already been compromised by the Sasol facility just to the north of the study area and, in the surrounding area, coal mines (effectively adding an industrial layer).<br><br>A detailed HIA was undertaken to assess potential archaeological and cultural impacts resulting from the proposed development during the construction and |

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| | operational phase (Chapter 11 of this EIA Report). The integrated HIA (Archaeology, Cultural Landscape and Palaeontology) that was prepared during the Scoping phase was submitted to SAHRA and MPHRA for consideration and comment. Comments were obtained from these stakeholders and are included in Appendix D in Part B of this EIA Report. The final HIA will also be uploaded to SAHRIS and will also be submitted to the MPHRA for comment and/or approval during the 30-day public commenting period of the Draft EIA Report.<br><br>In terms of palaeontology, the specialist states that since the site visit by the archaeologist for this project confirmed that the land has been ploughed and planted in the last few decades, it is unlikely that any fossils will be seen before excavations commences. Therefore, a desktop study was undertaken with a Fossil Chance Find Protocol that was added to the EMPr (Part C of this EIA Report). This approach has been accepted by SAHRA in their letter dated 19 August 2022. |
| **2.5.15. in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?** | Chapter 4 provides a list of other REFs that received EA or are being proposed within 50 km from the Vhuvhili SEF site. These projects are included in the cumulative impact assessments undertaken by the specialists that were included in the cumulative impact assessments that were undertaken (Chapters 6-15 of the EIA Report).<br><br><u>Note</u> that the proposed Vhuvhili SEF is not located within any of the gazetted Renewable Energy Development Zones (REDZs). |
| **2.6. How were a risk-averse and cautious approach applied in terms of socio-economic impacts?** | |
| **2.6.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?** | This was addressed in the detailed Socio-Economic Impact Assessment that was undertaken for the proposed Vhuvhili SEF (Chapter 13 of this EIA Report). |
| **2.6.2. What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic** | |

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| **vulnerability and sustainability) associated with the limits of current knowledge?** | The precautionary approach has been adopted for all aspects of this study, i.e. assuming the worst-case scenario will occur and then identifying ways to mitigate or manage these impacts.<br><br>The Project Developer negotiating agreements with the landowners of land portions that will be affected by the proposed Vhuvhili SEF. It is assumed that owners of the affected land portions will be appropriately compensated for any loss in income, infrastructure or land incurred as a result of the project. It is assumed that landowners will in the process of negotiation communicate any constraints associated with the placement of the Vhuvhili SEF and its associated infrastructure.<br><br>The Socio-Economic Impact Assessment that was undertaken for the Vhuvhili SEF, made use of secondary and primary data collection methodologies. It is assumed that no significant developments or changes in the socio-economic characteristics will take place in the area of influence between data collection and submission of the report. Neither the assumptions nor limitations were highlighted to negatively affect the assessment findings of the Socio-Economic Impact Assessment. |
| **2.6.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?** | |
| **2.7. How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following:** | |
| **2.7.1. Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?** | The development of the proposed Vhuvhili SEF will provide electricity to Sasol to produce green hydrogen and aviation fuel. Therefore, the proposed SEF will provide socio-economic benefits as identified by the detailed Socio-Economic Impact Assessment (Chapter 13 of this report).<br><br>The assessment of the local socio-economic conditions and potential impacts were included in the Socio-Economic Impact Assessment. The assessment was informed by the local planning documents, i.e., the local municipal IDP. Govan Mbeki is the second fastest growing population with an annual population growth rate of 3.10% |
| **2.7.2. Positive impacts. What measures were taken to enhance positive impacts?** | |
| **2.8. Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socioeconomic** | |

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| **impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?** | in the whole of the Mpumalanga Province (after Steve Tshwete with a population growth of 4.29%) (Govan Mbeki IDP (2021/2022)). A population growth of this proportion is likely to place strain on existing backlogs and the municipality's ability to effectively service the community. This, combined with the high unemployment rates and low-income levels implies the need for employment provision which would be provided during both the construction and operation phase of the proposed Vhuvhili SEF.<br><br>As indicated, the proposed development aims to provide opportunities for economic growth and development through supporting the proposed Vhuvhili SEF. Furthermore, the provision of temporary employment opportunities, improved income levels, and skills development, aligns the proposed development with several key aspects and strategic objectives outlined in the national, provincial, district, and local policies. The proposed project aligns with the strategic planning for the area in terms of renewable energy development plans as contemplated in the local and district municipal IDPs and the local municipality's LED Strategy. A detailed analysis of this strategic alignment is provided in the responses to Need and Desirability question 2.1.1 and question 2.1.4, above.<br><br>To ensure that the proposed project adopts Best Practice, the best practicable environmental option, and responsibility for environmental health and safety consequences throughout the development's life cycle, the EIA process was informed by 11 specialist assessments as listed in Table 1.3. These specialist inputs provided measures to mitigate the potential negative impacts of the proposed project, and to ensure that the best location for the Vhuvhili SEF and associated infrastructure is selected. The recommended mitigation measures and best practice guidelines provided by the specialists have been translated into the EMPr (Part C of the EIA Report) for implementation on site should the proposed project receive EA and construction materialise. |
| **2.9. What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?** | |
| **2.10. What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)? Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?** | |
| **2.11. What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?** | |
| **2.12. What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?** | |

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| **2.13. What measures were taken to:** | |
| **2.13.1. ensure the participation of all interested and affected parties,** | The Public Participation Process (PPP) that is undertaken as part of the EIA process is included in Chapter 4 Appendix D of this EIA Report. It provides a description of various methods used to notify potential I&APs of the proposed project and the opportunity to comment on the Draft Scoping Report and Draft EIA report, namely, through notices in the local newspaper, sites notices, emails, sms text messages and the placement of reports on web-based platforms such as Googledrive.<br>Interested and Affected Parties were notified of the opportunity to comment on the Draft EIA Report which was released for a 30-day commenting period. |
| **2.13.2. provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,** | |
| **2.13.3. ensure participation by vulnerable and disadvantaged persons,** | |
| **2.13.4. promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,** | The EIA process has taken cognisance of all interests, needs, and values espoused by all I&APs. Opportunity for public participation has been provided to all I&APs throughout the S&EIA Process in terms of the NEMA EIA Regulations, 2014, as amended. |
| **2.13.5. ensure openness and transparency, and access to information in terms of the process,** | The PPP that was undertaken as part of the Scoping Phase and which is being undertaken in the EIA Phase is included in Chapter 4 and in Appendix D of Part B of this EIA Report. Various methods were employed to notify potential I&APs of the proposed project and the opportunity to comment on the Draft Scoping Report and the Draft EIA Report, namely, through notices in the local newspaper, sites notices, emails, sms text messages and the placement of reports on web-based platforms such as Googledrive. |
| **2.13.6. ensure that the interests, needs and values of all interested and affected parties were taken into account and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge,** | The EIA process has taken cognisance of all interests, needs and values expressed by all I&APs. |
| **2.13.7. ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein was promoted.** | Public participation of all I&APs has been promoted and opportunities for engagement were provided during the EIA process. |

| **NEED** | |
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| **Question** | **Response** |
| **2.14. Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?** | This is addressed in the Socio-Economic Impact Assessment that is included in Chapter 13 of this EIA Report.<br><br>The interest, needs and values expressed by I&APs in the form of comments received during the 30-days comment period will be included in the Comments and Responses Report which will be submitted to the Mpumalanga DARDLEA with the Final EIA Report.<br><br>In the interim, the proposed project's consistency with the needs of the local community as expressed through the local and district IDPs has been determined as acceptable and in alignment with local priorities and objectives. A detailed analysis of this strategic alignment is provided in the responses to Need and Desirability question 2.1.1 and question 2.1.4, above. |
| **2.15. What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?** | An EMPr was developed to address health and safety concerns. An Environmental Control Officer (ECO) will be appointed to monitor compliance with the EMPr and EA (should such authorisation be granted) during the construction and operational phases. The EMPr is included in Part C of this EIA Report. |
| **2.16. Describe how the development will impact on job creation in terms of, amongst other aspects:** | |
| **2.16.1. the number of temporary versus permanent jobs that will be created,** | The socio-economic benefits provided by the proposed Vhuvhili SEF have been identified and assessed in the Socio-Economic Impact Assessment that is included in Chapter 13 of the EIA Report. In addition, local employment opportunities will be provided as far as possible. Where possible, the construction of the proposed Vhuvhili SEF will utilise contractors who employ labourers from the local community and therefore encourage socio-economic development at a local scale, as is encouraged under the GMLM LED Strategy 2014 and beyond. |
| **2.16.2. whether the labour available in the area will be able to take up the job opportunities (i.e., do the required skills match the skills available in the area),** | |
| **2.16.3. the distance from where labourers will have to travel,** | |
| **2.16.4. the location of jobs opportunities versus the location of impacts (i.e., equitable distribution of costs and benefits),** | |

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| **Question** | **Response** |
| **2.16.5. the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).** | |
| **2.17. What measures were taken to ensure:** | |
| **2.17.1. that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment,** | The different government departments have been listed as I&APs and were given the opportunity to comment on the Draft Scoping Report and are also given the opportunity to comment on the Draft EIA Report during the 30-day public commenting period. Comments received during the 30-days review period will be included in the Comments and Responses Report which will be submitted to the Mpumalanga DARDLEA with the Final EIA Report. |
| **2.17.2. that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?** | This will be determined during the EIA Phase (following the Public Participation Phase undertaken as part of the Scoping Phase). |
| **2.18. What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?** | The proposed project will adhere to the principles of environmental management. Measures taken to ensure adherence to the principles of NEMA have been determined during the EIA process and translated into the EMPr (Part C of this EIA Report) for implementation on site (should EA be received and construction materialise). |
| **2.19. Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?** | The proposed mitigation measures included in the EMPr, that is included as Part C of this EIA Report, were informed by the specialist assessments undertaken. This includes detailed assessment of the environment as well as the impacts associated with the proposed development. Detailed specialist assessments (Chapters 6-15 of the EIA report) have all concluded that the project can proceed, with no fatal flaws or unacceptable impacts identified as part of the project's proposal. Therefore, the mitigation measures are deemed to be realistic. Further, Solar PV Facilities can be dismantled and completely removed from the site leased for the development and do not permanently prevent alternative land-uses on the same land parcel. |
| **2.20. What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or** | The EMPr (Part C in the EIA Report) of this proposed project must form part of the contractual agreement and be adhered to by both the contractors/workers and the Project Applicant. |

| NEED | |
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| **Question** | **Response** |
| **adverse health effects will be paid for by those responsible for harming the environment?** | |
| **2.21. Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?** | Agriculture on site is influenced by climatic variables and limitations. Renewable energy development is a suitable land use option for the site. The proposed project would be more robust in terms of economic viability and profitability while also being largely uninfluenced by climate change variables. The proposed project would also provide the farm owners with additional income by way of lease agreements with the Project Applicant and will also contribute to local socio-economic upliftment through job creation.<br><br>Please refer to Chapter 5 of this EIA Report where the preferred alternatives considered as part of this EIA Process are discussed. The Socio-Economic Impact Assessment notes that the project is aligned with the needs of the local community and with local priorities and objectives as expressed through the local and district IDPs as is therefore acceptable. A detailed analysis of this strategic alignment is provided in the responses to Need and Desirability question 2.1.1 and question 2.1.4, above.<br><br>Further, to ensure that the proposed project adopts Best Practice and the best practicable environmental option, the EIA process was informed by 11 specialist assessments as listed in Table 1.3. These specialist inputs provided measures to mitigate the potential negative impacts of the proposed project, and to ensure that the best location is selected on the project site. The detailed specialist assessments (Chapters 6-15) all concluded that the project can proceed, with no fatal flaws or unacceptable impacts identified as part of the project's proposal. The recommended mitigation measures and best practice guidelines provided by the specialist have been translated into the EMPr (Part C of this EIA report) for implementation on site should the proposed project receive EA and construction materialise. |

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| **Question** | **Response** |
| **2.22. Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope, and nature of the project in relation to its location and other planned developments in the area?** | The potential cumulative impacts resulting from the proposed project were objectively determined. The cumulative impacts of similar types of projects that have received EA or whose EA status is pending (e.g., other renewable energy projects within a 50 km radius of the proposed project) were assessed and are included in the specialist studies undertaken for this EIA process (Chapters 6 -15) of this EIA Report. |

## 1.11 Objectives for this Environmental Impact Assessment Report

The EIA Phase of the S&EIA Process is shaped by the findings of the Scoping Phase. The NEMA EIA Regulations, 2014, as amended, stipulate that the EIA Process must be undertaken in line with the approved Plan of Study for the EIA, and that it must include a description of the potential environmental impacts, mitigation and closure outcomes, as well as the residual risks of the proposed activity. In broad terms, the objectives of the EIA Process in terms of the NEMA EIA Regulations, 2014, as amended, are to:

- determine the policy and legislative context within which the activity is located and note how the proposed activity complies with and responds to the policy and legislative context;
- describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- identify the location of the development footprint within the preferred site based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
- determine the nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and the degree to which these impacts (a) can be reversed; (b) may cause irreplaceable loss of resources, and (c) can be avoided, managed or mitigated;
- identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;
- identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
- identify suitable measures to avoid, manage or mitigate identified impacts; and
- identify residual risks that need to be managed and monitored.

In terms of legal requirements, a crucial objective of the EIA Report is to satisfy the requirements of Appendix 3 of the NEMA EIA Regulations, 2014, as amended (as noted in Regulation 23 (3) of the GN R982). This section regulates and prescribes the content of the EIA Report and specifies the type of supporting information that must accompany the submission of the EIA Report to the CA. An overview of where the requirements of Appendix 3 of the 2014 NEMA EIA Regulations are addressed in this EIA Report is presented in the Summary section in the beginning of this EIA report.

As noted in Regulation 23 (4) of the GN R982, the EMPr that is required as part of the EIA Process is provided in Part C of this EIA Report and has been structured to comply with the requirements outlined in Appendix 4 of the NEMA EIA Regulations, 2014, as amended. An overview of this compliance is provided in the EMPr in Part C of this EIA Report. In addition, GN R320 prescribes the general requirements for undertaking site sensitivity verification and protocols for the assessment and minimum report content requirements for identified environmental impacts for environmental themes in terms of sections 24(5)(a) and (h) and 44 of NEMA, when applying for EA. The Specialist Assessments undertaken as part of this S&EIA Process comply with GN R320, where applicable, including Agriculture, Aquatic Biodiversity, and Avifauna. It should be noted that the Terrestrial Biodiversity Specialists were appointed prior to the protocols in terms of GN 320 came into effect. Therefore, a Terrestrial Biodiversity Impact Assessment was undertaken in terms of

Appendix 6 of the NEMA EIA Regulations, 2014, as amended. The remaining specialist assessments also comply with Appendix 6 of the said regulations and where relevant, Part A of GN R320 which contains site sensitivity verification requirements where a Specialist Assessment is required but no specific assessment protocol has been prescribed. The Compliance Statement and Site Sensitivity Verification required for Civil Aviation and Defence respectively also comply with GN R320. The protocols were enforced within 50 days of publication of the notice i.e., on 9 May 2020. Furthermore, this process is designed to satisfy the requirements of Regulations 41, 42, 43 and 44 of the 2014 NEMA EIA Regulations, 2014, as amended relating to the PPP and, specifically, the registration of and submissions from I&APs.

During the Scoping Phase, the Draft Scoping Report (DSR) for the proposed Vhuvhili SEF was made available to Interested and Affected Parties (I&APs) and stakeholders for a 30-day comment period which extended from 13 June to 14 July 2022 (excluding public holidays). The comments received from stakeholders during the 30-day review of the Scoping Report were incorporated into the Final Scoping Report (FSR) (where required) and captured in the Comments and Responses Report that was included in the FSR. The FSR was submitted to the DFFE on 27 July 2022 for decision-making (i.e., approval or rejection) in line with Regulation 21 (1) of GN R326. It is important to note that (for the purpose of completeness and continuity), the comments received from I&APs during the Scoping Phase are included in the Comments and Responses Report that forms part of this Draft EIA Report. The Mpumalanga DARDLEA accepted the FSR and Plan of Study for EIA in a letter dated 29 August 2022 and received via email by CSIR on 28 September 2022, which marked the end of the Scoping Phase (Appendix F of this EIA Report), after which the EIA Process moved into the impact assessment and reporting phase. For background on the Scoping Process, the reader is referred to the Final Scoping Report (CSIR, 2022).

As noted above, the Draft EIA Report is currently being made available to stakeholders for a 30-day comment period. All comments received during the 30-day comment period will be incorporated into the Final EIA Report, captured in the Comments and Responses Report, that will be submitted with the Final EIA Report to the Mpumalanga DARDLEA for decision-making (i.e. approval or rejection) in line with Regulation 24 of GN R326.